Motivation for Hearing Aid Uptake amongst Malay Adults in the Klang Valley, Malaysia

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Motivation for Hearing Aid Uptake amongst Malay Adults in the Klang Valley, Malaysia

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DECLARATION

I certify that this thesis is composed of original work and does not contain any material previously submitted for a degree or diploma in any university, and that to the best of my knowledge and belief does not contain any material previously published or written by another person except where due reference is made in the text. I also certify that the research reported in this thesis has been approved by the University of Canterbury Human Ethics Committee and the Malaysian Research and Ethics Committee of the Ministry of Health, Malaysia.

Nurlin Ali Hanafiah Date: 8th December 2016

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ABSTRACT

Hearing rehabilitation is not a straightforward process as evident from established factors influencing adults' rehabilitation decision. However, it cannot be assumed that the factors identified apply to Malaysian malay adults due to differences in culture, religious belief, health belief, social support, and service delivery. The objectives of this study were to: 1) describe the audiometric and demographic profiles of adults consulting for audiological services at the Hospital Sungai Buloh (HSB) and Hospital Tengku Ampuan Rahimah (HTAR), in the Klang Valley, Malaysia, 2) explore the internal and external factors perceived to influence hearing aid uptake amongst the adults with hearing impairment, and 3) apply the World Health Organisation's International Classification of Functioning, Disability, and Health (ICF) terminologies in describing the internal (*personal* in ICF terminology) and external (*environmental* in ICF terminology) factors perceived to influence hearing aid uptake.

A sequential quantitative-qualitative mixed method research design was selected to achieve the research objectives. A retrospective cohort study design was selected for the Part 1 study in order to identify profiles of adults consulting for audiology service at the HSB and HTAR. One hundred data points from each hospital containing demographic and audiological information were analysed and described quantitatively. The result served to guide participant selection criteria for the Part 2 qualitative study. Twenty-two Malay adults, 11 from each hospital, participated in the Part 2 study. The participants recruited from HSB aged between 40 and 69 years, while those from HTAR were aged between 50 and 69 years.

In the Part 2 study, two-stage semi-structured in-depth interviews were conducted: 1) Stage 1 interviews were carried out following the participants' hearing

assessment, and 2) Stage 2 interviews were conducted following the participants' hearing demonstration. Through qualitative content analysis, categories generated were grouped into eight factor groupings, developed using the ICF terminologies, delineating personal factors, environmental factors and factors associated with activities and participation. While many of the results corroborated findings from previous research, new categories found included those associated to hearing aid demonstrations, perceptions of hearing aids and its use, stage of life, cultural practice, and religious belief. Hearing aid demonstration session was found to be an important factor facilitating hearing aid uptake.

In summary, this study showed that Malaysian malay adults with hearing impairment who seek hearing help for the first time perceive a multitude of factors that influence their decisions to adopt hearing aids. The identified factors inform audiologists to be more perceptive of the clients' needs and issues regarding hearing aids. This study also demonstrated that these factors can be contextualised using the ICF terminologies, providing a common language for clinical applications and future research. Areas for improvement for the audiology public service were identified and gaps of knowledge highlighted for future studies.

KEYWORDS

uptake, hearing aid, factors, motivation, ICF, adults, Malaysian

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ADL	Activities of daily living
AL	Activity limitations
ASHA	American Speech-Language-Hearing Association
BEHL	Better ear hearing level
BSA	British Society of Audiology
CHI	Conductive hearing impairment
CPHI	Communication Profile for the Hearing Impaired
CSOM	chronic suppurative otitis media
dB	Decibel
ENT	Ear, Nose and Throat
EPF	Employees Provident Fund
EU	European Commission
FM	Frequency modulation
GP	General Practitioner
HA	Hearing aid
HDHS	Hearing Disability and Handicap Scale
HHDI	Hearing Handicap and Disability Inventory
HHIA	Hearing Handicap Inventory for Adults
HHIE	Hearing Handicap Inventory for the Elderly
HHIE-S	Hearing Handicap Inventory for the Elderly-Screening version
HL	Hearing Level
HSB	Hospital Sungai Buloh
HTAR	Hospital Tengku Ampuan Afzan, Klang

IADL	Instrumental ADL
ICF	International Classification of Functioning, Disability and Health
IIUM	International Islamic University Malaysia
ISO	International Organisation for Standardization
JPA	Department of Civil Service, Malaysia
KKM	Kementerian Kesihatan Malaysia (Ministry of Health, Malaysia)
MHI	Mixed hearing impairment
MMPI-2	Minnesota Multiphasic Personality Inventory
MOH	Ministry of Health, Malaysia
MREC	MOH Research and Ethics Committee
MYR	Malaysian Ringgit
NHS	National Health Service
NIH	National Institute of Health
NIHI	Noise induced hearing impairment
NMRR	National Medical Research Register
NZAS	New Zealand Audiological Society
OME	Otitis media with effusion
PR	Participation restrictions
PTA	Pure tone audiometry
RECD	Real ear coupler difference
RM	Ringgit Malaysia
SD	Standard deviation
SEA	South East Asia
SF-36	Short Form 36 Health Survey
SNHI	Sensorineural hearing impairment

SOCSO	Social Security Organisation
TBP	Hospital medical relief fund
TCM	Traditional and complementary medicine
TTM	Trans-theoretical model
UK	United Kingdom
UKM	Universiti Kebangsaan Malaysia
US	United States of America
USM	Universiti Sains Malaysia
WHO	World Health Organisation
WHO-DAS II	WHO Disability Assessment Schedule II

CHAPTER 1

INTRODUCTION

1.1 Research overview

Hearing help seeking and hearing aid uptake is a new area of study in the field of audiology in Malaysia. The profiles of adults hearing help-seekers and factors influencing their decisions regarding hearing aid use are unknown. A sequential mixed method design (Giddings & Grant, 2006) was selected in order to address the research questions in this study. A mixed method research has much strength as it offers a broader focus than a single method design and is particularly useful for clinical settings where comprehensive information about a phenomenon can be obtained to guide decisions about a practice (Giddings & Grant, 2006). In a sequential design, one method is used first, followed by the other in order to elaborate or expand the findings from the first part of the study. This investigation was divided into two parts: Part 1 involved a quantitative retrospective study design; Part 2 involved a qualitative prospective study design. Part 1 of the study was designed to provide valuable information about first time hearing help-seekers in Malaysia, which was used to guide the participant selection criteria in the Part 2 qualitative study.

The goal of qualitative research is to attempt "to understand, gain insight, and describe human meaning making, behaviours, and beliefs …based on close examination of spoken or written words, pictures, or moving images regarding or created by the research participants" (Knudsen, Oberg, Nielsen, Naylor, & Kramer, 2010, p. 84). It is a broad approach to the study of social phenomena where the research is conducted in natural settings rather than in a laboratory or through written surveys. The approach to qualitative study is generally based in

the theoretical perspective of interpretivism (Knudsen et al., 2012), a paradigm in which the researcher tries to understand the social world as it is from the perspective of individual experience (Rossman & Rallis, 2012). Another similar perspective that leads to the use of qualitative inquiry is the constructivist philosophy, or social constructivism (Creswell, 2003), which assumes that individuals seek understanding of the world by developing subjective meanings of their experiences with objects in the world (Caelli, Ray, & Mill, 2003; Creswell, 2003). There are multiple and varied perspectives of the world, therefore researchers rely on the rich description from their participants.

In the second qualitative part of the investigation, the researcher conducted semi-structured in-depth interviews with adults who had completed a hearing consultation from a public health service provider in the Klang Valley, Malaysia and for whom amplification had been recommended by the audiologist. A qualitative approach was selected for this phase of the investigation because this is an area of new exploration in Malaysia whereby important variables had not yet been identified. Therefore, there is a need to obtain the insider's perspective on what they perceive to influence their rehabilitation decision.

1.2 Rehabilitation decision

An individual's decision towards a rehabilitation option is not a straightforward process. There are numerous factors that play a role in the decision-making process following a recommendation for audiological rehabilitation (Cox, Alexander, & Gray, 2005; Fischer et al., 2011; Knudsen et al., 2010; Laplante-Lévesque, Hickson, & Worrall, 2010a; Laplante-Lévesque, Knudsen, et al., 2012; Saunders, Frederick, Silverman, Nielsen, & Laplante-Lévesque, 2016). These factors will be presented and discussed in the chapters six and seven. Understanding the various influences on rehabilitation decisions is important to service providers in order to provide a client-centred approach to decision making (Laplante-Lévesque et al., 2010) and may contribute to improvement of the service delivery system.

One way of addressing these factors is by categorising them as internal or external factors in order to address the factors strategically. Currently there are no studies in the field of audiology that specifically examine the internal and external factors regarding decision-making in healthcare, but a reference can be made from other healthcare studies. For example, in a study of binge eating episodes in a group of women with bulimia nervosa, Waters, Hill and Waller (2001) identified internal states and external factors that form an interaction which lead to binge eating resulting from cravings. In this study, the internal states (factors) relate to the participant's perception and action (i.e., craving, eating the craved food) while the external factors relate to the participant's environment and situation (i.e., time of day, social circumstances). This finding lead to a recommendation that clinical work to reduce the likelihood of binge eating should consider the components that address the full range of antecedents, including the internal and external factors.

In view of decision making for audiological rehabilitation, some of the internal factors involved would be identified as the individual's demographics, self-perception, and

personality (Cox et al., 2005; Garstecki & Erler, 1998; Humphrey, Herbst, & Faurqi, 1981). Some of the external factors would include cost, other people's perception and healthcare delivery system (Bertoli et al., 2009; Duijvestin et al., 2003; Humphrey et al., 1981). The World Health Organisation's (WHO) International Classification of Functioning, Disability and Health (ICF) refers to the internal factors as *personal factors*, and the external factors as *environmental factors* (World Health Organisation, 2001). The personal and environmental factors are components of contextual factors that interact with health conditions, and the interaction determines the functioning and disability of an individual. The environmental component of the contextual factors can be expressed both in *positive* and *negative* terms. In the positive term, an external factor is regarded as facilitating an individual in functioning, whereas in the negative term, an external factor could serve as a barrier to functioning; hence a disability. Developed as a tool of classification designed for use in research, clinical practice, and social policy and education, the ICF terminology may also be used to describe factors influencing rehabilitation decisions. This could aid comparison of research findings regarding rehabilitation decision across different cultures and society (World Health Organisation, 2001, 2002).

1.2.1 Overview of the ICF

The ICF is an internationally recognised classification for the description of health and health-related states. These states, or domains, describe changes in body functions and structures, what an individual with a health condition can do in a standard environment, and their actual level of performance. The ICF utilises the "biopsychosocial" approach in order to portray the integration of the various perspectives of health from a biological, individual and social perspective (World Health Organisation, 2001). It acknowledges the influence of an individual's environmental factors and personal factors (contextual factors) that affect functioning and disability. *Functioning* is an umbrella term comprising of all body functions, activities, and participation, while *Disability* is termed to encompass impairments, activity limitations and participation restrictions. Therefore, the ICF aims to provide a common language and framework for displaying how the interactions between the individual's Health Condition and Contextual Factors are associated with changes to their Functioning, Disability and Health.

There are two parts to the ICF; each contains two components, which can be expressed in both positive and negative forms. The first part is termed Functioning and Disability, which includes the components of: (i) Body Functions and Structures, and (ii) Activities and Participation. The positive and/or neutral aspects of Functioning and Disability indicate non-problematic aspects of health and health related states which are described in terms of Body Functions and Structures, Activities, and Participation (under the umbrella term Functioning). The negative aspects of health and health related states indicate problems, and are described in terms of Impairments, Activity Limitations and Participation Restrictions (under the umbrella term Disability) (World Health Organisation, 2001).

The second part of the ICF is called Contextual Factors and consists of: (i) environmental factors, and (ii) personal factors. The environmental factors *"make up the physical, social and attitudinal environment in which people live and conduct their lives"* (World Health Organisation, 2001). It consists of five domains: (i) products and technology, (ii) natural environment and human-made changes to environment, (iii) support and relationship, (iv) attitudes, and (v) services, systems and policies. The environmental factors must be considered for each component of functioning, and presented from the perspective of the individual whose situation is being described. For example, background music may be a hindrance to conversation for a person with bilateral moderate sensorineural hearing impairment, but a facilitator to a person suffering from tinnitus.

The personal factors are the other component of contextual factors but are not classified in the ICF. Although they are acknowledged to have an impact on an individual's functioning and outcome of interventions, it not classified *"due to the large social and cultural variance associated with them"* (World Health Organisation, 2001). Personal factors are the specific life and living background and features of the individual that are not part of a health condition or states. These include gender, race, comorbid conditions, lifestyle, education, past and current experience, and behavioural pattern and character style (World Health Organisation, 2002). Figure 1.1 shows the ICF model, which illustrates the interrelationship between an individual's Health Condition, Contextual Factors, and their Functioning and Disability.

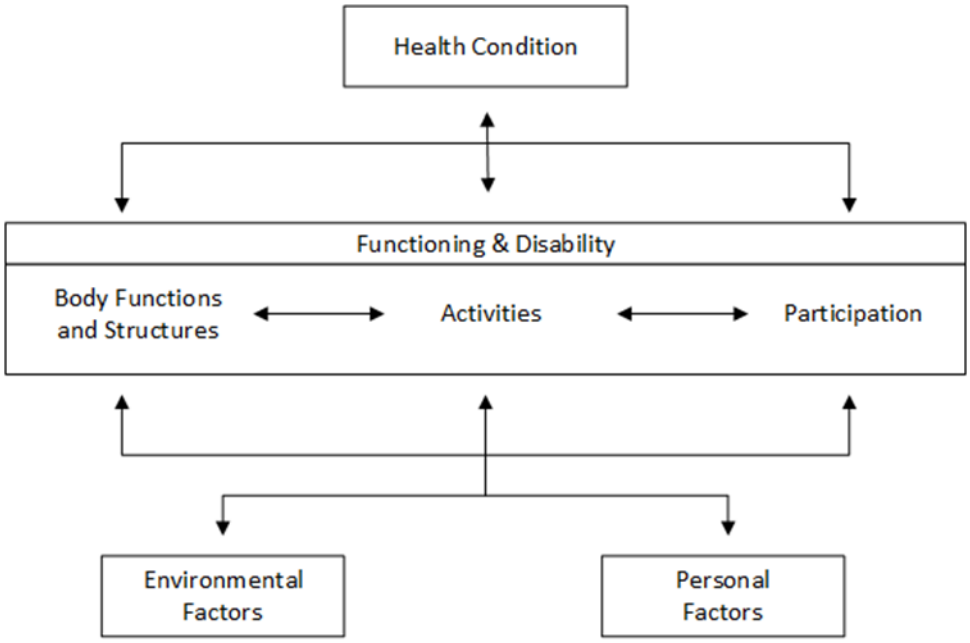

Figure 1.1 The interaction between the components of the International Classification of Functioning, Disability and Health (ICF) (World Health Organisation, 2001)

1.2.1.1 The ICF Core Sets for Hearing Loss

The ICF classification offers a hierarchical coding system, which consists of various ICF categories representing the basic units of classification. Each unit of classification describes the situation of each individual within a range of health or health-related domains (World Health Organisation, 2001). Examples of categories and codes relevant to hearing are:

- Body Functions components:
    - b 1560 Auditory perception: Mental functions involved in discriminating sounds, tones, pitches and other acoustic stimuli.
    - b 2300 Sound detection: Sensory function relating to sensing the presence of sounds

- b 2304 Speech discrimination: Sensory function relating to determining spoken language and distinguishing it from other sounds

- Body Structure components:
  - s 260 Structures of inner ear

- Activities and Participation component:
  - d 115 Listening: Using the sense of hearing intentionally to experience auditory stimuli, such as listening to a radio, music or a lecture
  - d 310 Communicating with – receiving – spoken messages: comprehending literal and implied meanings of messages in spoken language such as understanding that a statement asserts a fact or is an idiomatic expression
  - d 3503 Conversing with one person: Initiating, maintaining, shaping and terminating a dialogue or interchange with one person, such as in discussing the weather with a friend

- Environmental factors component:
  - e 1251 Assistive products and technology for communication: Adapted or specially designed equipment, products and technologies that assist people to send and receive information, such as specialised vision devices, electro-optical devise, specialised writing devices, drawing or handwriting devices, signalling systems and special computer software and hardware, cochlear implants, hearing aids, FM auditory trainers, voice prostheses, communication boards, glasses and contact lenses

- e 410 Individual attitudes of immediate family members: General or specific opinions and beliefs of immediate family members about the person or about other matters (e.g. social, political and economic issues), that influence individual behaviour and actions.

In total there are over 1400 ICF categories covering a broad range of diseases or conditions (Danermark et al., 2010; Granberg et al., 2014). As the exhaustive list is quite complex for use in daily practice, a series of instruments based on the ICF were created by the WHO, for example, the ICF Checklist and the WHO Disability Assessment Schedule II (WHO-DAS II) ("ICF core sets project," n.d). However, due to the generic feature of the instruments and the need for a detailed and comprehensive classification to describe profiles of individuals having specific health conditions, the WHO, in collaboration with the ICF Research Branch developed “the rigorous scientific process” which lead to the Comprehensive and Brief ICF Core Sets ("ICF core sets project," n.d).

In 2008 researchers at the Swedish Institute for Disability Research initiated work on developing ICF Core Sets for hearing loss, in collaboration with the ICF Research Branch; the International Federation of Hard of Hearing People; and WHO’s Classification, Terminology and Standards Team (Danermark, Granberg, Kramer, Selb, & Möller, 2013). The purpose of the endeavour was to increase knowledge about the ICF and to promote its use within the audiological community. As a result, two versions of the core sets, (1) Comprehensive ICF Core Set for Hearing Loss, and (2) Brief ICF Core Set for Hearing Loss that are internationally accepted, evidence-based, reliable, comprehensive, and valid were developed (Granberg et al., 2014). The Comprehensive ICF Core Set for Hearing Loss, which consists of 117 ICF categories, is intended to be used by clinicians as a checklist to assess individual needs, to formulate rehabilitative goals, to evaluate the effects of interventions, and to assess progress. The Brief ICF Core Set, consisting of 27 categories (selected from the 117

categories in the comprehensive version), would facilitate international studies and studies comparing the consequences of different conditions (Danermark et al., 2010).

Currently, the use of the ICF is focused on the description of situations regarding human functioning and disability. Studies related to factors influencing help-seeking, hearing aid uptake, hearing aid use, and hearing aid satisfaction have been undertaken for many years and have shown many consistent findings as well as new factors (Bertoli et al., 2009; Cox et al., 2005; Duijvestin et al., 2003; Garstecki & Erler, 1998; Gatehouse, 1994; Knudsen et al., 2010; Kricos, 2000; Laplante-Lévesque et al., 2010a; Laplante-Lévesque, Hickson, & Worrall, 2012; Laplante-Lévesque, Knudsen, et al., 2012; Meyer & Hickson, 2012; Southall, Gagne, & Jennings, 2010). The terminologies and language used in the ICF is internationally accepted, and with the recent development of the ICF Core Sets for Hearing Loss, it is thought that the ICF terminologies could also be used to describe the factors investigated in the current study.

CHAPTER 2

LITERATURE REVIEW

2.1 Hearing impairment

Various organisations and associations around the world that are concerned with the hearing health form their own formal definitions of hearing impairment based upon hearing levels (Shield, 2006). The following sub-section presents a discussion of a number of these definitions.

2.1.1 Definition

The World Health Organisation (WHO) defines hearing impairment as a complete or partial loss of the ability to hear from one or both ears (World Health Organisation, 2016b). The WHO classifies hearing impairment into five grades, as presented in Table 2.1. (World Health Organisation, 1991). Grades 2, 3 and 4 are classified as disabling hearing impairment for adults 15 years or older, while greater than 30 dB HL is the level used for children aged up to 14 years. The amount of hearing impairment was defined in terms of the pure tone average of the three frequencies, 0.5, 1 and 2 kHz, until 1997 when the hearing threshold at 4 kHz was included in the calculation (World Health Organisation, 1997).

Table 2.1: WHO grades of hearing impairment (source: World Health Organisation, 2016b)

Grade of impairment	**Corresponding audiometric ISO value (better ear)**	**Performance**	**Recommendations**
0 No impairment	25 dB HL or better	No or very slight hearing problems	
1 Slight impairment	26 - 40 dB HL	Able to hear and repeat words spoken in normal voice at 1 metre	Counselling. Hearing aids may be needed.
2 Moderate impairment	41 - 60 dB HL	Able to hear and repeat words using raised voice at 1 metre	Hearing aids usually recommended.
3 Severe impairment	61 - 80 dB HL	Able to hear some words when shouted into better ear	Hearing aids needed. If not available, lip-reading and signing should be taught.
4 Profound impairment	81 dB HL or greater	Unable to hear and understand even a shouted voice	Hearing aids may help understanding words. Additional rehabilitation needed. Lip-reading and sometimes signing essential.

In the United States of America (US), the classification system adopted by the American Speech-Language-Hearing Association (ASHA) defines hearing impairment

in six categories based on Clark's 1981 classification (American Speech-Language Hearing Association, 2015), which begins at a hearing level of 16 dB HL. In New Zealand this classification is also commonly used by the audiologists, as per the New Zealand Audiological Society (NZAS) practice guidelines (Digby, Purdy, & Kelly, 2015). This classification uses an average of the pure tone audiometry threshold at 0.5, 1, 2, and 4 kHz. The categories are presented in Table 2.2.

Table 2.2 The categories of hearing impairment adopted by ASHA (2015)

Degree of hearing impairment	Hearing level(dB HL)
Normal	-10 to 15
Slight	16 to 25
Mild	26 to 40
Moderate	41 to 55
Moderately severe	56 to 70
Severe	71 to 90
Profound	91 and above

Australian Hearing is a statutory authority established by the Australian Government in 1947 (Australian Hearing, 2013). It is the nation's leading hearing specialist and largest provider of the government funded hearing services. Australian Hearing categorises hearing impairment into four degrees (Australian Hearing, 2013, September 27) which are shown in Table 2.3.

Table 2.3 The Australian Hearing degrees of hearing impairment

Degrees of hearing impairment	Hearing level (dB HL)
Normal	20 and under
Mild	21 to 45
Moderate	46 to 65
Severe	66 to 90
Profound	91 and over

In the United Kingdom, the British Society of Audiology (BSA) is the leading organisation concerned with hearing and balance problems (British Society of Audiology, 2016). The BSA (as cited in Shield, 2006) uses the average pure tone audiometry thresholds at 0.25, 0.5, 1, 2 and 4 kHz and categorises the hearing impairment according to the definitions shown in Table 2.4.

Table 2.4 BSA definitions of hearing impairment

Ranges of hearing level	Hearing level (dB HL)
Normal	Less than 20
Mild	20 to 40
Moderate	41 to 70
Severe	71 to 95
Profound	96 and over

The audiology practices in European countries use the definition of hearing impairment set by the European Commission (EU) (Roth, Hanebuth, & Probst, 2011). Hearing impairment is defined as the better ear hearing loss (BEHL) of the average four frequencies 0.5, 1, 2 and 4 kHz (Shield, 2006). The hearing impairment categorisation is presented in Table 2.5.

Table 2.5 The EU categorisation of hearing impairment

Categorisation	Hearing level (dB HL)
Normal	Less than 20
Mild	21 to 39
Moderate	40 to 69
Severe	70 to 94
Profound	95 and over

In Malaysia, the Ministry of Health (MOH) provides a comprehensive audiological service through its network of specialist hospitals and district hospitals located throughout the nation (Perkhidmatan Audiologi KKM, 2014a). The audiology unit's standard operating protocol (Perkhidmatan Audiologi KKM, 2014b, 2014c) presents the degrees of hearing impairment as shown in Table 2.6.

Table 2.6 The MOH Malaysia degrees of hearing impairment

Degrees of hearing impairment	Hearing level (dB HL)
Normal	20 and under
Mild	25 to 40
Moderate	45 to 65
Severe	70 to 85
Profound	90 and over

There are some differences in the definitions of hearing impairment between the various organisations presented above. Table 2.7 provides a summary of these definitions. The majority of the definitions have adopted a four-category definition of hearing impairment, but others have adopted more categories. It can be observed that there are variations in the range of dB HL in each of the categories of hearing impairment. For the definition of normal hearing, there is as much as 10 dB difference in the upper level of the range with 25 dB HL being the highest level. In most cases, profound hearing impairment is assumed to begin at around 90 dB HL, but in other organisations it can be lower for example, 81 dB HL. These differences show that care must be taken when conducting reviews of the literature on any aspects of hearing impairment where grades are discussed. For the purpose of this study, the definition adopted by MOH was used to describe audiological data.

Table 2.7 Summary of definitions of hearing impairment (dB HL)

	Normal	**Slight**	**Mild**	**Moderate**	**Moderately severe**	**Severe**	**Profound**
WHO (average 0.5, 1, 2, 4 kHz)	≤ 25		26 - 40	41 - 60		61 - 80	≥ 81
ASHA and NZAS (average 0.5, 1, 2, 4 kHz)	≤ 15	16 - 25	26 - 40	41 - 55	56 - 70	71 - 90	≥ 91
Australian Hearing	≤ 20		21 - 45	46 - 65		66 - 90	≥ 91
BSA (average 0.25, 0.5, 1, 2, 4 kHz)	< 20		20 - 40	41 - 70		71 -95	≥ 96
EU (average 0.5, 1, 2, 4 kHz)	< 20		21 - 39	40 - 69		70 - 94	≥ 95
MOH Malaysia	≤ 20		25 - 40	45 - 65		70 - 85	≥ 90

2.1.2 Causes

Hearing impairment is also described in terms of site of lesion. There are three types of hearing impairment: conductive, sensorineural and mixed. They may occur congenitally, (present at birth or associated with the birthing process), or be acquired (either as a child or as an adult). A conductive hearing impairment (CHI) results from the obstruction of either the outer or middle ear (or both) that prevents sound from reaching the inner ear. An obstruction may be congenital (e.g., microtia or atresia), or it might be acquired (e.g., cerumen accumulation in the external auditory canal, or otitis media in the middle ear) (Tye-Murray, 2009). Other causes of CHI include otitis externa, otosclerosis, cholesteatoma, tumour, Paget's disease of the bone, and disarticulation of the ossicular chain (Weener, Zacharak, & Malani, 2010).

Sensorineural hearing impairment (SNHI) results from disturbances in the inner ear, eighth cranial nerve, brainstem, midbrain, or auditory cortex. SNHI also can occur congenitally or later in life. SNHI might be caused by any number of factors, including: genetic factors, maternal infections or postnatal infections. Amongst adults, a significant cause of acquired hearing impairment is exposure occupational noise, which accounts for 16% of the disabling hearing impairment in adults (Nelson, Nelson, Concha-Barrientos, & Fingerhut, 2005). Other causes of acquired SNHI might relate to ototoxic medication, vascular disease, autoimmune disease, auditory nerve tumours, Meniere's disease, and ageing (Weener et al., 2010).

A mixed hearing impairment (MHI) is described when both CHI and SNHI are present. In adults MHI might be present, for instance, due to genetic conditions such as osteogenesis imperfecta where the hearing impairment often occurs in the second to fourth decade of life (Kuurila, Kaitila, Johansson, & Grénman, 2002).

2.1.3 Treatment

Treatment of hearing impairment may be medical, audiological, or combination of both. CHI may be treated medically or naturally resolve with time. Medical treatments may include medications for middle ear infections and surgical restoration of the physiological hearing mechanism (Low, 2005). Sudden SNHI, which might occur due to infection, vascular causes or head trauma, is treated with corticosteroids to a varying degree of success (Chau, Cho, & Fritz, 2012).

In some cases of CHI and most cases of SNHI, audiological management is the only solution. Management options include hearing aids, assistive listening devices, communication strategies, and cochlear implants. When prosthetic solutions are indicated, the first consideration is typically given to the use of hearing aids. However, amongst adults with hearing impairment, less than one-fourth own a hearing aid and even fewer use their hearing aid(s) regularly (Garstecki & Erler, 2009). Knudsen, Öberg, Nielsen, Naylor and Kramer (2010) conducted a descriptive summary of the literature to reveal that there are many factors influencing help seeking, hearing aid uptake, and hearing aid use and satisfaction. Apart from hearing sensitivity and demographic factors, other influencing factors include motivation, attitude toward hearing aids and expectations. These will be further discussed in the subsequent section of this thesis.

2.2 Prevalence of hearing impairment

2.2.1 Prevalence of hearing impairment by region

In 2012, WHO estimated 360 million people in the world have disabling hearing impairment and 91% (328 million) of these are adults aged 15 years and above (World Health Organisation, 2016a). This figure is possibly an underestimation as many studies of prevalence of hearing impairment use different criteria, which makes comparison and estimation difficult. For instance, in the US, Lin, Niparko and Ferrucci (2011) estimated a prevalence of 12.7% for Americans aged 12 years and above with bilateral hearing impairment. The estimated prevalence increased to 20.3% when individuals with unilateral hearing impairment are included. In another US study which also used the WHO classification of hearing impairment, Agrawal, Platz and Niparko (2008) obtained an overall prevalence of unilateral and bilateral hearing impairment of 16.1%. This prevalence is lower than the result of Lin et al.'s study possibly due to different participant ages where the Agrawal et al. study investigated people aged from 20 to 69 years.

Shield (2006) compared a number of studies on prevalence of hearing impairment in Europe, as displayed in Table 2.8. The results of the studies showed consistency in terms of the overall prevalence of hearing impairment. From the table, minor differences can be seen in the age groups and the way hearing impairment is defined. Apart from that, Shield reported that the Swedish study excluded participants who had been exposed to industrial noise, and the Italian study only included city populations. Therefore, the prevalence in these countries as well as Denmark (small age range) could be higher if the differences did not occur.

Table 2.8: Summary of surveys of hearing impairment in Europe (Source: Shield, 2006)

Country	UK	Italy	Finland	Denmark	Sweden
Reference	Davis 1991	Quaranta et al. 1996	Uimonen et al. 1999	Karlsmose et al. 2000	Johansson & Arlinger 2003
No of participants	2662	2170	3518	705	590
Age of participants (in years)	18-80	18-80	2-75	31-50	20-80
% population with BEHL ≥ 25 dB HL	16.1	17.1	15	14.3*	16.9

BEHL= better ear hearing level. *Subjective hearing impairment

The overall prevalence of hearing impairment in the US, UK and European countries are similar to each other and are similar to a survey conducted in Australia (Wilson et al., 1999) which found overall prevalence of 16.6% among participants aged 16 years and over. However, these findings differ from the findings of population-based studies conducted in countries in the South East Asia (SEA) region (World Health Organisation, 2007). The difference may be due to the use of the WHO protocol, which takes into account the estimation of significant (or disabling) hearing impairment in the better ear. This includes hearing impairment of more than 40 dB HL in the better ear for adults, and hearing impairment with more than 30 dB HL in the better ear for children. The prevalence of deafness and hearing impairment in countries in the SEA region is depicted in Table 2.9. It is noted that when all levels of hearing impairment are

included (such as in the studies conducted in Nepal and Thailand) the prevalence is similar to that of the US, UK, Australia and European countries.

Table 2.9: Prevalence of hearing impairment (Source: World Health Organisation, 2007)

Country	% prevalence of hearing impairment in the population
Bangladesh	9% (2002)
India	6% (1997)
Indonesia	4.2% (2002)
Maldives	6% (1997)
Myanmar	8% (1997)
Nepal	16.6%* (1990)
Sri Lanka	9% (1998)
Thailand	13.3%* (year not available)

*Not based on WHO protocol. Includes milder degrees of hearing impairment as well

A study in Brazil (Baraky et al., 2012) also looked at the prevalence of disabling hearing impairment and the result (5.2%) is similar to the findings in countries in the SEA region.

2.2.2 Prevalence of hearing impairment by age

It is well known that hearing impairment increases with age. (Stevens et al., 2013) analysed data from 29 countries to produce an estimation of global and regional hearing impairment prevalence. They estimated prevalence of hearing impairment at various categories but highlighted the prevalence at ≥ 35 dB HL (average of the frequencies of 0.5, 1, 2 and 4 kHz) for the better ear. Their calculation revealed that the global prevalence of hearing impairment among children aged 5-14 years was 1.4%. Globally, the prevalence of hearing impairment of males aged ≥15 years was 12.2% and is higher than females of the same age group, which was 9.8%. Hearing impairment was found to be most prevalent in South Asia (2.2%), sub-Saharan Africa (1.9%) and in the Asia Pacific region (1.8%). Childhood hearing impairment was lowest in high-income regions, at 0.4%. For adults, the greatest prevalence of hearing impairment was in the South Asian region (13.2%) and Central-Eastern Europe and Central Asian region (13.9%).

The above study found high prevalence of childhood and adult hearing impairment in lower income region. This may be due to higher rates of pre- and post-natal infection that lead to childhood hearing impairment. Poor access to medical intervention and unavailability of programmes for prevention of deafness and hearing impairment (World Health Organisation, 2007) may contribute to higher prevalence of adult hearing impairment in the low income regions. Presbycusis (age related hearing impairment) is the leading cause of adult-onset hearing impairment, followed by noise-induced hearing impairment (Mathers, Smith, & Concha, 2000). As life expectancy in developed countries increases, the prevalence of adult hearing impairment is expected to increase as well (Roth et al., 2011)

2.3 Impact of hearing impairment

2.3.1 Impact of hearing impairment of individuals

Hearing impairment hinders effective communication, which is an important aspect of everyday life (Hickson & Worrall, 2003; Kelly-Campbell & Plexico, 2012; Ruben, 2000). As a result of communication breakdown, adults can become lonely, annoyed, angry, depressed, and socially isolated (Heine & Browning, 2002; Ramage-Morin, 2016; Weinstein & Ventry, 1982) leading to an overall perceived reduction in quality of life (Arlinger, 2003). In a study of the impact of hearing impairment on quality of life in older adults, Dalton, Cruickshanks, Klein, Klein, Wiley and Nondahl (2003) utilised the Hearing Handicap Inventory for the Elderly-Screening version (HHIE-S; Ventry & Weinstein, 1983) to assess difficulties with communications, while measures of activities of daily living (ADL), instrumental ADLs (IADLs) and the Short Form 36 Health Survey (SF-36; Ware, 1993) were used to assess health-related quality of life. The domains of health status measured by the SF-36 are physical functioning, role physical, bodily pain, general health perception, vitality, social functioning, role emotional, and mental health. With the HHIE-S, they found that 52% of the 2688 participants reported having problems with communication, which were more prevalent with increasing severity of hearing impairment. Severity of hearing impairment was also associated with ADL and IADL impairments. Severity of hearing impairment, hearing handicap, and self-reported communication difficulties were all found to be associated with reduced quality of life as measured by the SF-36.

Findings from the above study is supported by findings from a study by Chia et al. (2007). As part of the Blue Mountains Hearing Study, Chia et al. (2007) investigated the association between hearing impairment and health-related quality of

life by using the SF-36 (Ware, 1993). They reported that bilateral hearing impairment was associated with significantly poorer health-related quality of life compared to unilateral hearing impairment or no hearing impairment. The participants with bilateral hearing impairment had poorer SF-36 scores in both the physical and mental dimensions compared to scores from participants without hearing impairment.

There is also an abundance of studies exploring the psychosocial effects of hearing impairment in adults of all ages and gender (Shield, 2006). These include, amongst many, negative effects on family relationships, stigmatisation and low self-esteem, education and employment issues and even psychiatric disturbances.

2.3.2 Impact of hearing impairment on significant others

Parents and significant others form an important support system to people with hearing impairment, and therefore are subjected to the impact of the impairment. The disability and functioning of family members as a result of the hearing impairment of their significant other, known as third-party disability, is well documented (Hétu, Jones, & Getty, 1993; Kelly-Campbell & Plexico, 2012; Quittner, Gleuckauf, & Jackson, 1990; Scarinci, Hickson, & Worrall, 2011; Scarinci, Worrall, & Hickson, 2009, 2012; Stephens, France, & Lormore, 1995).

Frustration is one of the psychosocial consequences most commonly reported by significant others (Stephens et al., 1995) apart from high level of dependence, as family members often need to talk loudly and speak on behalf of the person with hearing impairment. High levels of stress are one of the problems faced by parents of children with hearing impairment. Quittner, Glueckauf and Jackson (1990), in a study on chronic parenting stress, reported that mothers of children with hearing impairment rated their children as more hyperactive, demanding, moody, and less adaptable. These mothers found carrying out family routines more difficult and rated parental activities more stressful. They also found that these mothers perceived having less emotional support, had a smaller available network of social support, and less frequent contact with family members and friends compared to mothers of children with normal hearing. These findings suggest that mothers of children with hearing impairment may be socially isolated and may be stigmatised by their child's condition.

Hétu et al. (1993) reviewed the literature and thoroughly discussed the interactive dimension of the effects of hearing impairment on spouse and other intimate relationships, namely unmarried, heterosexual or homosexual partnerships. The

handicapping effects (Hétu et al., 1993) experienced by the significant others are suggested to be the result of both partners misunderstanding each other's experiences. Summary of the handicaps reported by the unimpaired significant others are presented in table 2.10. Examples of daily life situations that led to the psychosocial effects experienced by the significant other are provided.

Table 2.10 Handicaps reported by the significant others with unimpaired hearing (source: Hétu et al., 1993)

Handicaps reported by the unimpaired significant other
Stress, tension, irritation
Having to tolerate loud television listening
Having to tolerate loud speech
Making up with the social dependence of the impaired spouse
Worrying because of unreliability with warning signals and telephone answering and message taking
Embarrassment in social gatherings
Effort, fatigue
Repeating things over and over
Having to always answer the phone
Bearing the burden of being an interpreter
Having to cover up- to act as an intermediary with the children and in social gathering
Frustration, anger, resentment and guilt
Isolation in groups
Restriction of leisure activities
Being deprived of social encounters; being imposed a narrowing of social life
Irritation and impatience due to misunderstandings
Being upset because the person with a hearing impairment live in a world of his/her own
Being upset because the person with a hearing impairment does not make enough efforts, understands what he/she wants to

	Frustration because of severe restrictions of intimate communication; feeling resentment because of various sources of frustration related to hearing difficulties; feeling guilty because of expressions on impatience and anger related to frustrations
	Feeling that the burden of support and adjustment to hearing impairment is not acknowledged by the impaired person

Most of the literature reviewed by Hétu et al. (1993) was predominantly involving younger adults and female spouses of male workers with NIHI (Donaldson, Worrall, & Hickson, 2004 ; Hétu et al., 1993). Later studies involving perspectives of older adults found agreements in effects of hearing impairment on partners of adults with hearing impairment with the earlier findings (Donaldson et al., 2004 ; Kelly-Campbell & Plexico, 2012; Stephens et al., 1995). Scarinci, Worrall, and Hickson (2008), through interpretive analyses of qualitative study, discovered four themes that provided insights into the experiences of spouses of older adults with hearing impairment. The first theme was *'The broad ranging effects of the hearing impairment on the spouses' everyday lives'* which included various aspects of communication issues, reduction in and limitation to everyday activities, negative emotions, their relationship with the hearing impaired spouse and on social activities. The second theme was *'The spouses' need to constantly adapt to their partners' hearing impairment'*, which entailed actions that the hearing spouses took to accommodate to their impaired partner. The third theme was '*The effect of acceptance of the hearing impairment on the spouse'*, which was expressed in reference to the degree of acceptance by the hearing impaired partner. Finally, the fourth theme generated was *'The impact of ageing and retirement'*, which consisted of issues that the hearing spouse attributed to the ageing process and retirement (Scarinci et al., 2008).

Additionally stigma was found to be an effect and that stigma was attached to both hearing impairment and itself and to the ageing process (Kelly-Campbell & Plexico, 2012). In their qualitative study investigating couple's experiences of living with hearing impairment, Kelly-Campbell and Plexico discovered that partners with hearing impairment perceived stigma in terms of negative reactions from others when they converse loudly or repeatedly in public. Participants without hearing impairments also expressed that their partners' hearing impairments affected their perceptions of their own aging.

2.3.3 Impact of hearing impairment on society

Hearing impairment can also have an impact on society. The effects depend on whether hearing impairment occurs before language development (prelingual) or after (postlingual). Children who suffer from prelingual hearing impairment grow up with delays in speech and language acquisition. These children seldom easily develop understandable speech and may be stigmatised by the hearing community (Ebrahimi et al., 2015; Hintermair, 2007). This stigmatisation may lead to integration into a separate Deaf community, which has distinctive needs, such as special education for the Deaf (Reagan, 1985). In the US, Gallaudet University was established to provide education that accommodates the Deaf and hard of hearing (Gallaudet University, n.d.) in order for them to build a career for themselves and to be competitive in the hearing world.

People with postlingual hearing impairment require specialised services and resources in order to function in a hearing society, leading to increased economic costs for the society. Specialised services needed for children with hearing impairment include, but are not limited to, speech language therapy, early-intervention programmes, and special schools and classroom placements (Tye-Murray, 2009). Early identification of hearing impairment through newborn hearing screening programmes has shown benefits in terms of early language development (Yoshinaga-Itano, Sedey, Coulter, & Mehl, 1998) but not without a cost.

In the United Kingdom, a study was conducted to evaluate the economic costs of congenital bilateral permanent childhood hearing impairment in the preceding year of life for children aged 7 to 9 years (Schroeder et al., 2006). The estimated arithmetic mean societal cost for the use of health and social services for the 183 children with hearing impairment who participated in the study conducted by Schroeder was

£14092.5, compared with £4206.8 for the children with normal hearing. The resources used included community and social care services, day care services, hospital outpatient services, hospital inpatient admissions and educations.

As adults, people with hearing impairment are faced with employment issues and low earning potential. Shield (2006), in a report for HEAR-IT stated that "there is now a significant amount of more recent data to show that a greater proportion of deaf and hard of hearing people is unemployed than of the hearing population. Furthermore, among those who are employed, a higher percentage of hearing impaired people than of the general workforce are in the lower grades of employment" (p. 148). Ruben (2000) studied the costs of various communication disorders to the US's economy revealing that the income for adults with hearing impairment was 40% to 45% of the population with normal hearing.

Over a lifetime, the expected cost for an individual with severe to profound hearing impairment to the United State of America's economy was $297,000 (Mohr et al., 2000). Mohr et al. (2000) reported that the largest component of societal loss (67%) was due to reduced work productivity, and they estimated that working adults with severe to profound hearing impairment were earning only 50 % to 70% of their non-hearing-impaired peers. Recently, Neitzel, Swinburn, Hammer, and Eisenberg (2017) revealed that in 2013 the economic impact of hearing loss on productivity in the US was $615 billion. With their estimation of 10% - 20% of NIHI prevalence in the US, the economic benefit of reducing the prevalence of NIHI could amount to $152 billion annually.

2.4 The Malaysian context

2.4.1 Prevalence of hearing impairment in Malaysia

In 2005, the Ministry of Health conducted a National Survey on Ear and Hearing Disorders (Ministry of Health Malaysia, 2007). One of its objectives was to establish the prevalence and causes of hearing disorders in Malaysia. The study design was based on the World Health Organisation (WHO) Ear and Hearing Disorder Survey Protocol WHO/PBD/PDH/99.8 (1). A total of 7041 participants of all ages participated in a face-to-face interview using a structured questionnaire followed by a hearing assessment by an audiologist and an ear assessment by an ear, nose and throat (ENT) specialist.

In the general population, the prevalence of hearing impairment was 17.1%, with similar figures shown within the urban (17.3%) and rural areas (16.8%). Mild degree of hearing impairment is more prevalent (12.1%) compared to the more significant moderate to severe degree (5%) of hearing impairment. The prevalence of unilateral and bilateral hearing impairment was 5.4% and 11.4%, respectively. Amongst the major ethnic groups namely, Malay, Chinese, and Indian, the Chinese participants were found to have the highest prevalence (21%) followed by the Malay participants (15.7%). Male participants (20.6%) were found to have higher prevalence of hearing impairment than females (13.6%). In terms of age, the prevalence increases dramatically with age, between the age groups of 20-49 (14.3%), 50-59 (41.8%) and 60 and above (69.9%). In addition, this study investigated the help seeking patterns amongst participants, and found the majority (77.2%) of participants who were informed of their hearing impairment or felt that they had a hearing impairment did not

seek treatment. There was no further report on the assessment and treatment for those who had who sought help for their hearing impairment

As mentioned in the previous section, due to differences in outcome criteria as well as population demographics, comparison between countries is difficult. Nevertheless, the overall prevalence of hearing impairment in Malaysia (17.1%) is comparable to the United Kingdom and European countries (15%- 17.1%) (Shield, 2006), Egypt (16.0%) (Abdel-Hamid, Khatib, Aly, Morad, & Kamel, 2007), Australia (16.6%) (Wilson et al., 1999), and the US (20.3%) (Lin et al., 2011).

On the other hand, when looking at significant hearing impairment (40 dB HL or more) Malaysia shows prevalence of 5%. This figure is comparable to the 5.2% prevalence in Brazil (Baraky et al., 2012) and a number of countries in the SEA region, which are India (6%), Indonesia (4.2%), Maldives (6%), and Myanmar (8%) (World Health Organisation, 2007).

A distinct similarity in all of the above studies is the high prevalence of hearing impairment in adults aged 50 years and older. As in other parts of the world, one of the common causes of hearing impairment among adults above 50 years in Malaysia was identified as presbycusis (Ministry of Health Malaysia, 2007). The prevalence of presbycusis was 32.6% and increased to 43.5% for those aged 60 years and older. Other conditions associated with hearing impairment include impacted cerumen, chronic suppurative otitis media (CSOM) and otitis media with effusion (OME).

In the nationwide survey report, one condition that was not indicated as one of the causes of hearing impairment in Malaysia was noise induced hearing impairment (NIHI). NIHI due to occupational or recreational noise is known to be on the rise and increases the prevalence of hearing impairment among younger age groups (Agrawal et

al., 2008; Nelson, Nelson, Concha-Barrientos, & Fingernut, 2005; Shield, 2006). In Malaysia, a few studies have been conducted to measure the prevalence of NIHI and compliance to hearing conservation programme among workers in industrial occupations (Maisarah & Said, 1993; Masilamani, Rasib, Darus, & Ting, 2012; Nor Saleha & Noor Hassim, 2006). These studies have shown a prevalence of NIHI between 23.9% and 30.1% and low use of hearing protection devices among industrial workers. If compliance with hearing conservation programmes among industrial workers and owners remains low, NIHI may soon be recognised as one of the common causes of hearing impairment among adults in Malaysia.

2.4.2 History of Audiology in Malaysia

Audiology emerged from the establishment of a hearing aid dispensing company in the nation's capital Kuala Lumpur in 1945, providing technological expertise and advice in hearing aids, and counselling (M. Alisaputri, personal communication, November 14, 2016). In the 1980s, the number of hearing aid dispensing companies started to increase, reaching to at least 5 companies, some having multiple branches spread across the states of Malaysia (20dB Hearing, 2016a; Audiolab Sound Hearing Solution, 2016; Eartistic Hearing and Balance Centre, 2016; Perfect E.N.T. Hearing & Speech Centre, 2011).

In the public hospitals, hearing related problems were managed by the doctors in the ENT clinic. Hearing assessment was limited to pure tone audiometry, conducted by either trained nurses or medical assistants, and no other diagnostic tools were available for serious hearing and balance conditions. In 1994, the Faculty of Allied Health Sciences of the University Kebangsaan Malaysia (UKM) established the Department of Audiology and Speech Sciences. A year later, the faculty became the

first and only institution in Malaysia to offer undergraduate degree in Audiology. The first students of that programme graduated in 1999 (Lian & Abdullah, 2001).

Presently, there are additionally two public universities offering the Bachelor programme in Audiology, namely the International Islamic University Malaysia (IIUM) and the University Sains Malaysia (USM). The increasing demand for audiologists both in the public and private healthcare system, government institutions (education and military) as well as private hearing dispensing companies is likely to be the reason for the increased number of audiology training programmes.

2.4.2.1 Audiology service in Malaysia

Audiology service in the public sector in Malaysia was officially offered in the late 1990s as the Ministry of Health (MOH) Malaysia began recruiting the early graduates of audiologists produced by UKM. By the end of 2010 the number of audiologists servicing the public hospitals reached 90 (Ministry of Health Malaysia, 2012). All of the audiologists are located in specialist hospitals, providing services within the ENT clinics. At the beginning, the service was limited to pure tone audiometry and patients were referred to private hearing care centres for hearing aid fittings. In recent years, as the number of audiologists and resources has increased, the audiology services have expanded to include more comprehensive diagnostic testing and rehabilitation options such as hearing aid fittings and cochlear implantation (Salahuddin & Rajan, 2016).

Similar services are available from the private sector as well. Where previously limited to pure tone audiometry and hearing aid fitting, many hearing aid dispensing companies have extended their services to include impedance audiometry, tinnitus

management and, in some places, even auditory brainstem responses testing, cochlear implantation, and vestibular testing (20dB Hearing, 2016b; Eartistic Hearing and Balance Centre, 2016). Within the urban areas, a growing number of private hospitals have established audiology units and the more established hospitals offer comprehensive diagnostic assessment and extensive management options including cochlear implantation, assessment and management of auditory processing disorders, and vestibular rehabilitation (Loh Guan Lye Specialist Centre, 2016; Sunway Medical Centre, 2016).

The expansion of audiology services that evolved quite rapidly within the past decade is in part the result of the formulation of the National Plan of Action for Otorhinolaryngological and Audiological Services following the research findings of the 2005 National Survey on Ear and Hearing Disorders. This advocacy strategy has led to the implementation of a health promotion campaign, a prevention and identification programme, a high risk newborn screening programme, an auditory training programme, as well as a cochlear implant programme in several selected hospitals (Ministry of Health Malaysia, 2007). Verbal reports from audiologists in public services (N. A. Amri, personal communication, May, 13 2013) indicated positive outcomes in some of the programmes implemented, particularly in the auditory training programme, however these outcomes have not been published.

Hearing aid fitting is becoming a routine service provided in the public audiology sector. The audiologists are responsible for the selection, prescription and fitting of hearing aids for patients in MOH hospitals (N. A. Amri, personal communication, May, 13 2013). The uniformity of this process in the audiology clinics throughout all public hospitals is ensured through the publications of Guidelines for Hearing Aid Fitting and Prescription (2012) and Standard Operating Procedures:

Patient Management for Hearing Impaired Adults (2014b) and Children (2014c). In 2008 the MOH established its Cochlear Implant Programme and cochlear implant teams in eight hospitals nationwide (Salahuddin & Rajan, 2016, p. 2). With an annual grant of about RM5 million, cochlear implantations are funded for children with severe to profound hearing impairment who pass through the team's candidacy selection process. Each hospital carrying out the cochlear implant programme adhere to a standard operating procedure to ensure uniformity of practice (Medical Development Division, 2009).

2.4.2.2 Service delivery in Malaysia.

Health care service delivery differs from one country to another. In Malaysia, the public and private health care systems co-exist to provide a comprehensive health service to the nation. This section offers a brief overview of the Malaysian health delivery system.

2.4.2.2.1 Public sector.

Being the major provider and financier of health services, the Ministry of Health (MOH) provides services throughout the nation in at least 130 hospitals, 808 health clinics, 1920 community clinics, and 6 medical institutions (Ministry of Health Malaysia, 2009). The services range from outpatient curative care to preventive and promotion of health. The health care service is supplemented and complemented by other government agencies (Merican & bin Yon, 2002; Merican, Rohaizat, & Haniza, 2004). For example, the Ministry of Education is responsible for the operation of the university and teaching hospitals. The Ministry of Defence provides health services especially for its personnel and dependants but does not exclude the surrounding local population living within its territory. The Ministry of Rural Development looks after

the health of aborigines, through its jungle medical posts and a hospital for aborigines. The Ministry of Human Resources enforces and regulates the safety and health of industrial workers as well as the estate plantation workers, and under the purview of the Ministry of Housing and Local Government, the Local Authorities ensures licensing and enforces some of the specific health legislation within its jurisdiction. Merican and bin Yon (2002) and Merican et al. (2004) provide a more detailed description of the Malaysian health care system.

The public sector services are heavily accessed by public service employees and their dependants as they are charged special rates based on the employer-employee collective agreement (General Order/Service Circular), which is far below the prescribed fee schedule rates (Kananatu, 2002). It is also utilised by others, including foreign residents, due to the service's affordable rates and policy of not refusing treatment for anyone (Kananatu, 2002). Access to specialist service, however, is controlled through a national referral system (Yu, Whynes, & Sach, 2008). Specialist services are only available in designated hospitals (such as the national referral hospital in Kuala Lumpur, state hospitals and selected district hospitals), and referral is to the nearest facility if patients cannot be managed at the outpatient clinics.

2.4.2.2.2 Private sector.

The second major health provider is the private sector, providing health services through private hospitals and clinics throughout the country. The distribution of private medical facilities is concentrated within in the state capitals and urban areas due to demand by the affluent community (Merican & bin Yon, 2002). Between 1980 and 2001 there was a tremendous growth in the number of private hospitals, enhancing their role in provision of health care for the country (Merican & bin Yon, 2002). By 2009

there was a total of 209 licensed private hospitals, 6307 registered medical clinics and 1484 dental clinics spread across the nation (Thomas, Beh, & Nordin, 2011).

Access to the private clinics and hospitals are limited to the private sector employees and those who can afford higher fees (Merican & bin Yon, 2002). The patrons pay according to the fee schedule with an addition of separate fees for service, which are approved by the Malaysian Medical Association. The Malaysian government monitors and regulates the private facilities to ensure quality service and cost control (Kananatu, 2002). This was strengthened by the implementation of the Private Health Care Facilities and Services Act 1998 to be in accordance with the National Quality Assurance Programme (Yu et al., 2008).

Services in the private facilities are more curative and selective in nature (Thomas et al., 2011) and driven by the consumers' demand. The quality of care is perceived to be high. However, where a facility is unavailable, or when coming upon inpatients who cannot afford to pay the higher fees, referral is made to the public hospitals, leading to an increase of demand on the public service facilities (Kananatu, 2002)

2.4.2.2.3 Other Providers

Other providers of health care include the non-governmental organisations (NGOs) and traditional and complementary medicine (TCM). TCM in Malaysia is well accepted by the rural and urban communities and is comprised of traditional Malay, Chinese, Ayurvedic medicines and others (Merican et al., 2004). The contribution of the NGOs is usually voluntary and non-profit in nature, such as the Malaysian AIDS council, Malaysian Liver Foundation, and others. The majority of them complement the

tasks undertaken by the MOH especially in areas that are not be covered by the Ministry.

2.4.2.2.4 Audiology service delivery.

As mentioned in sub-section 2.3.2.1, audiology is a specialised service delivered within the ENT clinics, particularly in the public hospitals. The audiology clinic receives patients on a referral basis from medical practitioners in the public or private sector and adheres to the MOH audiology service operation management plan in the delivery of its services (Perkhidmatan Audiologi KKM, 2014a). The audiology service operation management plan describes the audiology clinic's vision, mission and objectives, and outlines the scope of services. It is supplemented with standard operating procedures for seven scopes of practice:

1) Standard Operating Procedure: Patient management for paediatric with hearing impairment
2) Standard Operating Procedure: Patient management for adults with hearing impairment
3) Standard Operating Procedure: Patient management for tinnitus
4) Standard Operating Procedure: Patient management for patients with retrocochlear problems
5) Standard Operating Procedure: Assessment and rehabilitation of patients with work related noise exposure
6) Standard Operating Procedure: Management of patients with compensation claims and medical legal case.

7) Standard Operating Procedure: Management of patients with vestibular and balance problems (Perkhidmatan Audiologi KKM, 2014a)

The routine for the audiology clinics is to provide assessment and rehabilitation services on an appointment basis. Patients are usually given appointments for audiology and ENT assessments simultaneously and occasional walk-in assessments are provided, upon request by the ENT specialist, to patients with special conditions such as sudden-onset SNHL (N. A. Amri, personal communication, May, 13 2013). For every patient diagnosed with a hearing impairment, information and counselling regarding hearing impairment and proposed interventions is provided. Whenever the patient agrees, an appointment is scheduled for a hearing aid demonstration (N. A. Amri, personal communication, May, 13 2013).

The Standard Operating Procedures: Patient Management for Adults (2014b) and Children (2014c) with Hearing Impairment outline and describe the standard process for hearing assessment, rehabilitation option, hearing aid demonstration, and hearing aid fitting, verification, and validation. However, these procedures may not be carried out in its entirety at every audiology clinic as there are different types of audiological facilities and equipment across the country particularly hospitals located in isolated districts and rural areas (R. F. B. R. M. Shah, personal communication, October, 2011). In a number of state hospitals located in the smaller districts, pure tone audiometry and impedance audiometry are the only tests performed with limited equipment for paediatric testing, whereas in larger hospitals more diagnostic tests are available to conduct real rear measurements, assess auditory evoked potentials and cochlear emissions. When dealing with hearing aid fitting, audiologists working under optimal settings rely on subjective feedback from patients in order to verify fitting as

real ear measurement equipment is not available (personal communication, June 17, 2016).

The cost of hearing aids is the responsibility of the individual or the family of the individual who requires them. However most patients who are recommended hearing aids qualify for financial assistance from various agencies such as the Public Service Department for civil servants and government pensioner, the Department of Veterans Armed Forces for military retirees, MOH Hospital Medical Relief Fund (TBP), social Welfare Department, and the Islamic Tithe Authority for the needy (Perkhidmatan Audiologi KKM, 2014b, p. 8). For employed individuals who contribute to the Employees Provident Fund (EPF), supportive documentation is provided to supplement applications for withdrawal to purchase hearing aids (N. A. Amri, personal communication, May, 13 2013).

2.5 Help seeking behaviour for adults with hearing impairment

As opposed to children, help seeking in adults with hearing impairment is a voluntary decision. An adult must first be aware of having a hearing impairment and perceive a need for rehabilitation before taking the initiative to seek help. It is known that not all adults with hearing impairment seek consultation (Duijvestin et al., 2003; van den Brink, Wit, Kempen, & van Heuvalen, 1996), and not everyone with hearing impairment is aware of, or acknowledges their communication problems. In the Netherlands, Duijvestin et al. (2003) found that only 57% of those diagnosed with hearing impairment judged their hearing as poor. This finding is supported by van den Brink et al. (1996) who found that adults who have hearing impairment but who have

not sought consultation perceived their hearing impairment as relatively insignificant and demonstrated a passive acceptance of hearing impairment.

For many people, it is not the degree of hearing impairment per se that prompts help-seeking or hearing aid uptake, rather it is the impact of hearing impairment on their daily lives (Swan & Gatehouse, 1990). Duijvestin et al. (2003) found no significant differences between the mean pure tone thresholds between consulting and non-consulting adults with hearing impairment. Social pressure perceived by significant others and the willingness of the person with hearing impairment to try hearing aids were found to be significant factors leading to their decision to seek help (Duijvestin et al., 2003; van den Brink et al., 1996). In addition, van den Brink et al. (1996) discovered differences in attitude between consulters and non-consulters, as well as between consulters who rejected hearing aids and those who proceeded with amplification. The participants who consulted their doctors but never tried a hearing aid perceived the most disadvantage of hearing aid use and this opinion was shared by their significant others.

2.6 Factors that motivate and act as barriers to hearing aid uptake

Low hearing aid uptake is a common issue, with reports of only about 10% of adults with hearing impairment worldwide use hearing aids (Mathers et al., 2000). Many studies have been undertaken to understand why hearing aid uptake is low, and identified influences of audiological and non-audiological factors on hearing aid uptake. In reviewing the literature, it was found that a number of the identified factors do not singly serve to motivate or act as barriers to hearing aid uptake but may have both effects depending on the individuals.

Knudsen, Öberg, Nielsen, Naylor and Kramer (2010) provided an extensive review of studies (conducted between the years 1980 and 2009) on factors influencing help-seeking behaviour of hearing impairment, hearing aid uptake, hearing aid use and satisfaction with the device. Search from Pubmed and CINAHL databases (two major databases covering audiological journals) yielded 39 articles that met their inclusion criteria and were included in their descriptive summary. These studies involved adults and the evidence described in the articles was based on empirical data (qualitative studies were not included). The factors that were identified to be influencing help-seeking, hearing aid uptake, hearing aid use and hearing aid satisfaction are presented in Table 2.11, where factors influencing hearing aid uptake is highlighted in a separate column.

Table 2.11: Factors influencing help-seeking, hearing aid uptake, hearing aid use and hearing aid satisfaction (source: Knudsen et al., 2010)

Factors influencing help-seeking, hearing aid uptake, hearing aid use, and hearing aid satisfaction	Factors especially influencing hearing aid uptake
Source of motivation	Attitudes towards hearing impairment (also dealing with and acceptance of hearing impairment)
Attitudes towards hearing aids	Personality
Attitudes towards hearing impairment (also dealing with and acceptance of hearing impairment)	Self-reported hearing problems (activity limitations, participation restrictions)
Expectations	Hearing sensitivity
Personality	Age
Self-reported hearing problems (activity limitations, participation restrictions)	Socioeconomic status
Dexterity	Cost
Health	
Medication	
Hearing sensitivity	
Age	
Age of onset of hearing impairment	
Duration of hearing impairment	
Gender	
Educational level	
Socioeconomic status	
Living relations	

Matrimonial status
Type of clinic (private vs. public)
General health attitude
Speech reading
Pre-fitting counselling
Fitting counselling
Post-fitting counselling
Dexterity/ handling of hearing aids during the fitting
Satisfaction with hearing aid professional/audiologists
Cost
Lifetime hearing aid experience
Cosmetic appearance of the hearing aids
Time or longitudinal change (also defined adaptation)
Amounts of social interaction
Activity of daily living
Major life events

The following paragraphs provide discussions on each areas identified that were found to influence hearing aid uptake.

2.6.1 Own attitude towards hearing impairment, including acceptance of and coping with hearing impairment

An individual's attitude toward his or her hearing impairment may serve to motivate or act as barrier to hearing aid uptake. In a study of psychological control amongst older adults who adhered to or rejected hearing aid recommendation, Garstecki and Erler (1998) found that for males, adherents were more accepting of their hearing impairment and found hearing impairment less stigmatizing than the non-adherents. This finding is in contrast to the investigation by Humes et al. (2003) who studied the differences between 3 groups; (a) non-adherents, who decline amplification, (b) adherents who subsequently rejected their hearing aids, and (c) adherents accepting and using their hearing aids. By using the Communication Profile for the Hearing Impaired (CPHI; Demorest & Erdman, 1987) they demonstrated that the non-adherent group had better self-acceptance of their communication problems and less stress associated with their problems when compared to those who pursued hearing aids. Humes et al. (2003) stated that this is because non-adherents were generally less aware of communication problems or tended to deny them. This supports the suggestion of Swan and Gatehouse (1990) that self-measured disability and handicap are probably the major influences to rehabilitation decision.

Another recent study that supports this general notion was that of Robertson, Kelly-Campbell, and Wark (2012). They compared clinical charts for three groups of adults who consulted for services: (a) those who purchased hearing aids and continued wearing them for at least 1 year, (b) those who purchased hearing aids but rejected them, and (c) those who did not follow the recommendation to purchase hearing aids. The groups were not significantly different in terms of degree of hearing impairment or ability to understand speech in quiet settings. However, they were significantly

different in terms of their ability to understand speech in noise, providing objective data that supports the notion that it is the consequences of hearing impairment that differentiated the groups and not the degree of impairment itself.

Use of maladaptive behaviour such as avoiding communication, taking over conversations and pretending to understand was also found to be related to the decrease of hearing aid uptake (Helvik, Wennberg, Jacobson, & Hallberg, 2008). From the studies above it could be summarised that acceptance of, and less stigma towards hearing impairment, as well as distress over hearing difficulties may serve to motivate people to take up hearing aids, whereas self-acceptance, use of maladaptive behaviour and denial of hearing problems may act as barriers to uptake of hearing aids.

2.6.2 Personality

The personality of adults seeking help for auditory problems has been the subject of much research in audiology. In an early study to provide a conceptual framework on components and determinants of hearing aid benefit, Gatehouse (1994) assessed aspects of hearing aid users' personality by administering the Crown-Crisp Experiential Index (Crown & Crisp, 1979) during an initial disability interview. Some aspects of personality were found to be significantly related to hearing aid satisfaction and use. Those with lower depression scores, higher hysteria scores and higher obsession scores had higher scores on hearing aid satisfaction. Those with higher hysteria scores scored higher on post-fitting aid use. It must be mentioned that the questions under the hysteria subscale appeared to denote "locus of control."

Locus of control measures explore the individual's belief in his or her ability to exert control over events or situations (Cox, Alexander, & Gray, 2005). Locus of control seems to be an important personality factor that is related to hearing aid uptake.

There are also gender differences with regards to locus of control. Garstecki and Erler (1998) found differences in locus of control for hearing aid-seeking behaviour in the elderly, however, this was only true for older women. In this study, locus of control was measured directly using selected items from the Rotter's Internal-External scale (Rotter, 1996) and indirectly through depression (measured using Minnesota Multiphasic Personality Inventory (MMPI-2); Hathaway & McKinley, 1940), and ego strength (measured using Minnesota Multiphasic Personality Inventory (MMPI-2) Barron's scale; Barron, 1953). Garstecki and Erler (1998) found that women who elected to pursue amplification after a recommendation demonstrated a greater orientation toward an internal locus of control than all other study participants, which may suggest that they are more likely to assume responsibility for the management of their hearing problems. They also found that women who did not pursue amplification after a recommendation exhibited the weakest internal locus of control compared to other participants, suggesting they experienced a reduced sense of control over their hearing.

In a recently published study by Kelly-Campbell and Allan (2016), locus of control was assessed through a content analysis of verbal behaviour. The results of that study indicated that participants who adopted hearing aids exhibited significantly higher internal locus of control than those who did not adopt. Conversely, participants who did not adopt hearing aids exhibited higher external locus of control, however this finding was not statistically significant. There was no significant relationship between locus of control and self-perceived hearing handicap nor were any gender differences found.

2.6.3 Self-reported hearing problems (activity limitations, participation restrictions)

Self-reported hearing related activity limitations and/or participation restrictions have been found to positively influence hearing aid uptake. Humes et al. (2003) administered the Hearing Handicap Inventory for the Elderly (HHIE) to their participants and the non-adherent group exhibited significantly lower scores compared to the adherent groups (adherents who subsequently reject their hearing aids and adherents accepting and using their hearing aids) indicating lower self-perceived participation restrictions.

A similar finding was reported by Gussekloo, de Bont, von Faber, Eekhof, de Laat, Hulshof et al. (2003) who conducted an intervention study to measure the effects of offering a standardised auditory rehabilitation programme to older adults with previously untreated hearing impairment. They administered the disability subscale of the Hearing Handicap and Disability Inventory (HHDI)-short version (van den Brink, 1995) to assess self-reported hearing disability prior to offering the intervention programme, which included amplification and hearing tactics. It was found that the median hearing disability score was higher amongst those who chose to accept intervention than those who rejected it. These studies have shown that subjective reports of hearing disability and hearing related activity limitations may lead to higher hearing aid uptake.

2.6.4 Hearing sensitivity

For some people, degree of hearing impairment appears to influence hearing aid uptake. This factor has been studied by a number of researchers. Garstecki and Erler (1998) found a significant difference in the pure tone average (0.5, 1, 2 and 4 kHz) for the female adherents and non-adherents. The female adherents had significantly poorer better ear hearing threshold average (42.5 dB HL) than the female non-adherents (33.5 dB HL). Helvik et al. (2008) conducted a study in which several variables were submitted to a regression analysis to determine which factors may contribute to hearing aid uptake. In addition to non-audiologic factors, they found that degree of hearing impairment (over 25 dB HL in the better hearing ear) was a significant confounding variable in the regression analysis. Likewise, Gussekloo et al. (2003) found, that for adults over the age of 85 years, degree of hearing impairment plays an important role in the decision to take up hearing aids.

All of the studies mentioned examine the population of older adults with hearing impairment. A survey conducted in the Unites States (Kochkin, 2009) found that when considering all adults with hearing impairment living in the US, degree of hearing impairment is related to hearing aid uptake. Kochkin reported that “4 out of 10 people with moderate to severe hearing losses and 1 out of 10 people with milder hearing losses adopt hearing aids to treat their hearing loss.” (p. 20). Hence, while hearing sensitivity may be related to hearing aid uptake, this factor seems to be intertwined with gender and age.

2.6.5 Age

The influence of age on hearing aid uptake has been studied differently in past literature. Knudsen et al. (2010, p. 136) stated that "..whereas almost all studies included age (and gender) as variables, only few regarded these as primary research variables or investigated them as independent predictors in a regression model." Regardless, many studies have found that age per se is not strongly associated with hearing aid uptake (Gussekloo et al., 2003; Helvik et al., 2008; Humes et al., 2003; Robertson et al., 2012). It is important to note that these studies tended to include older adults (i.e., mean age for the studies mentioned here were all above 65 years). However, the data presented by Kochkin (2009) demonstrated that (in the US) when a large age range is considered, there is a relationship between age and hearing aid uptake.

2.6.6 Socioeconomic status

The results involving the influence of socioeconomic status are mixed. This is possibly due to the some of the studies (e.g., Humphrey et al., 1981) being conducted in countries where free or subsidised hearing aids are available and therefore socioeconomic status was found to have no relation with hearing aid uptake (as cited in Knudsen et al., 2010). Gussekloo et al. (2003) reported no differences in income levels between participants who accepted a hearing aid rehabilitation programme and those who did not. On the other hand, Garstecki and Erler (1998) found that both female and male adherent groups were significantly more satisfied with their income levels than the non-adherent groups. In addition, the female non-adherent group reported lower annual income than the other participants. Contrary to the findings of Garstecki and

Erler (1998), Kochkin (2009) found that in the US (where there is no universal government subsidy), income was not a predictive factor in hearing aid adoption.

2.6.7 Cost of hearing aids

The findings of the effects of cost of hearing aids are similar to those relating to socioeconomic status. Garstecki and Erler (1998) found the non-adherents group was more likely to express concern about costs. This is supported by Kochkin (Kochkin, 2007) in the United State study where 76% of the respondents mentioned financial constraints as a barrier to hearing aid adoption. Forty-nine percent of those respondents indicated that unaffordability was the definite reason for not adopting hearing aids and more than half (52%) indicated high maintenance cost as a reason for non-adoption. Interestingly, Kochkin also reported that the average income of hearing aid adopters is lower than that of the non-adopters. This contradictory finding suggests that cost of hearing aids per se is perhaps not the main concern but the perception of cost or cost effectiveness of wearing hearing aids influences the decision.

2.6.8 Other systematic reviews

In the recent years, three other systematic reviews of literatures relating to factors influencing hearing aid uptake were undertaken (Jenstad & Moon, 2011; Meyer & Hickson, 2012; Ng & Loke, 2015), with some difference in research strategies (search terms, databases, and time frame) and aims. Jenstad and Moon (2011) reviewed the articles published between January 1990 and May 2010 to identify the main barriers and facilitators to hearing aid uptake in older adults who have been diagnosed as having hearing impairment and received hearing aid recommendation. The study sample of 14 articles featured mainly adults aged 65 years and above, who never used hearing aids,

and had degree of hearing impairment ranged from mild to severe. Studies included are those limited to having sample size exceeding 50 but not limited by type of data collection.

Meyer and Hickson (2012) also conducted a review of articles published between 1990 and 2010. Compared to the Jenstad and Moon (2011) study, Meyer and Hickson aimed at identifying factors influencing older adults' decision to first seek help for hearing impairment and adopt hearing aids. The article selection did not limit the sample size or type of data. A total of 22 articles were included in the review. The factors influencing hearing help seeking and hearing aid uptake were conceptualised using WHO's ICF framework and defined the factors in terms of functioning and disability, personal factors and environmental factors.

The third and most recent systematic review pertaining to factors influencing hearing aid uptake was conducted Ng and Loke (2015) to explore the determinants of hearing aid adoption and use amongst the older adults with hearing impairment. As the purpose of the study was also to explore use of hearing aids, the authors targeted articles that were published after the year 2000 in view of the wider popularity of digital hearing aids since the year 2000. A total of 22 articles of experimental and observational studies were included (qualitative studies excluded). The determinants of hearing aid adoption and use were categorised into audiological and non-audiological factors and were illustrated using the trans-theoretical model (TTM; Prochaska & Velicer, 1997). The TTM suggests that changes in health behaviour (for example, hearing aid adoption and use) involves six stages of change that progresses over time. The stages are: (1) pre-contemplation, during which a person does not intend to change own behaviour in the foreseeable future, (2) contemplation, during which a person considers changing while being aware of the advantages and disadvantages of changing

the behaviour, (3) preparation, during which a person is preparing to make a change in behaviour in the very near future, and has taken measures to gather information, (4) action, during which a person makes an observable change in behaviour, (5) maintenance, during which a person is intentionally maintaining the changed behaviour, and (6) termination, during which a person reaches a complete self-efficacy (Prochaska & Velicer, 1997). For further understanding of the origins and application of TTM the reader is referred to the article by Prochaska and Velicer (1997).

The factors influencing hearing aid uptake identified in the three articles of systematic review of literature (Jenstad & Moon, 2011; Meyer & Hickson, 2012; Ng & Loke, 2015) were consistent with each other. All three reviews found that self-reported hearing problems (including activity limitations and participation restrictions) and degree of hearing impairment were strong factors that serve as motivator to hearing aid uptake, while stigmatization of hearing impairment and hearing aid was a strong barrier to hearing aid uptake. Additional factors found to facilitate hearing aid uptake were perceived benefits of amplification (Meyer & Hickson, 2012), perceived significant other/s as supportive of hearing rehabilitation (Meyer & Hickson, 2012; Ng & Loke, 2015), age (Jenstad & Moon, 2011; Meyer & Hickson, 2012), socioeconomic status (Ng & Loke, 2015), and positive expectations about hearing aids (Meyer & Hickson, 2012). Additional barriers to hearing aid uptake reported were general practitioner's management of age-related hearing impairment, negative attitudes of significant other/s towards hearing aids (Meyer & Hickson, 2012), self-perceived hearing ability (Meyer & Hickson, 2012; Ng & Loke, 2015), and cost of hearing aids (Jenstad & Moon, 2011). Although Meyer and Hickson (2012) did not find strong evidence to support the influence of gender on hearing aid adoption, Jenstad and Moon (2011) viewed gender as a modifying factor to a few factors: stigma, degree of hearing loss and locus of

control. All three reviews reported personality and psychological factor to be a factor that serves to both support and hinder hearing aid uptake.

2.6.9 Qualitative findings of studies investigating factors influencing hearing aid uptake

So far, the factors influencing hearing aid uptake discussed were results from predominantly quantitative studies where the variables were predetermined by the researchers. Qualitative studies are being used more frequently in audiology as they have the ability to generate new perspective of known information (Knudsen et al., 2012) particularly pertaining to rehabilitative audiology. For example, Laplante-Lévesque, Hickson and Worrall (2010a) discovered different effects of some of the factors already mentioned as well as uncovering a new factor by applying qualitative research methods. In their study, 135 participants with acquired hearing impairment who had not received amplification were given four options of rehabilitation i.e., hearing aids, group communication programme, individual communication programme, and no intervention. A selected sub-sample of 22 participants was interviewed for description of the factors influencing their rehabilitation decision. The factors (categories) identified were: (1) convenience, (2) expected adherence and outcomes, (3) financial costs, (4) hearing disability, (5) nature of intervention, (6) other people's experience, recommendations, and support, and (7) preventive and interim solution. All factors were found to have a positive influence (motivator) and negative influence (barrier) to all participants who opted for hearing aids. For instance, in the case of factor (6), some participants reported of other people's positive recommendations and support as being an influence to hearing aid uptake, whereas, others reported other

people's negative experience with hearing aids and recommendations of health clinician to delay amplification as a barrier to hearing aid uptake.

Another advantage of qualitative approaches is that they may uncover a process experienced by people with hearing impairment during decision making. Laplante-Lévesque et al. (2010) discovered an emergence of a '*preventive and interim solution'* category. The preventive and interim solution underlines "how adults with acquired hearing impairment viewed their decision as ongoing and reversible, framing it in the context of the slowly degenerating health condition that is age-related hearing impairment." (p. 505). This is exemplified in one participant, who did not adopt hearing aids, viewing amplification as reducing one's ability to hear without them and becoming reliant on hearing aids. Other participants, who chose amplification, considered the permanency of rehabilitation outcome and view hearing aids as a long term solution to hearing impairment.

For her master's dissertation, Winsor (2011) conducted a qualitative investigation to investigate barriers and facilitators to hearing aid uptake in older females. Nine women aged between 60 and 75 years were interviewed following their diagnosis of hearing impairment. By using thematic analysis of semi-structured interviews, the overarching them dynamism was identified. Dynamism was described as the "dynamic interplay of factors" (p. 30) that influenced the individuals' decisions regarding hearing aid uptake. Within dynamism, 4 themes were identified: self-perceived hearing loss, information gathering and informed decision making, influence of others, and associated costs. This study not only uncovered new factors such as information gathering and informed decision making, it also described how the factors "interacted and played one upon the other" (p. 52) at the final decision made by each participants.

In summary, numerous studies have uncovered various factors that serve as motivators to hearing aid uptake as well as factors that act as barriers. Some factors may have both effects on different individuals depending on the individual's personality (Cox et al., 2005; Garstecki & Erler, 1998; Gatehouse, 1994) and support system (Laplante-Lévesque et al., 2010). Table 2.12 provides a summary of these factors.

Table 2.12: Summary of factors that serve to motivate and act as barrier to hearing aid uptake

Factors that motivate	Factors that act as barrier
Attitudes towards hearing impairment (also dealing with and acceptance of hearing impairment)	Attitudes towards hearing impairment (also dealing with and acceptance of hearing impairment)
Personality	Personality
Self-reported hearing problems (activity limitations, participation restrictions)	Socioeconomic status
Hearing sensitivity	Cost
Socioeconomic status	Stigmatisation of hearing impairment and hearing aid
Cost	General practitioner's management hearing impairment
Perceive benefits of hearing aids	Convenience
Perceive support from significant other/s	Expected adherence and outcomes
Convenience	Other people's experience and recommendations
Expected adherence and outcomes	
Other people's experience and recommendations	

Preventive and interim solution	Negative attitudes of significant others
Information gathering and informed	towards hearing aids
decision making	Perceived barriers to amplification
	Preventive and interim solution

2.7 Definition of hearing aid uptake

Knudsen et al. (2010), in their review of literature on factors influencing help-seeking, hearing aid uptake, hearing aid use, and satisfaction with hearing aids stated that from the body of literature the journeys that people with hearing impairment take as a process of hearing rehabilitation can be divided into three stages: (1) the stage prior to help seeking and uptake of hearing aids, (2) the period covering the process of the fitting; and (3) the short- or long-term period after the hearing aid fitting.

However, the definitions for help-seeking and hearing aid uptake have not been made explicit. For example, in the description of research method from a study conducted by Duijvestin et al. (2003), it was found that help seeking was referred to action taken by participants who made an impromptu decision to accept an opportunity to take part in a hearing test. Those participants were unaware of the offer for a hearing test as they were invited to gather for a different purpose. Another example is in the research conducted by Saunders et al. (2016), hearing aid uptake was equated to hearing behaviour. Description of their research methods revealed that hearing aid uptake was referring to the decision the participants made on acquiring hearing aids after seeking hearing help for the first time at the designated audiology facility.

Prior to designing the research method for this study a clear definition of hearing aid uptake was necessary. In this study hearing aid uptake is defined as *the journey from establishing a hearing diagnosis to the decision on acquiring hearing aids.*

2.8 Hearing help seeking and hearing aid uptake in Malaysia

Research on rehabilitative audiology and its outcomes in Malaysia have not received much emphasis, particularly with regards to help-seeking and hearing aid uptake. A search of the literature yielded only two studies pertaining to hearing aid use amongst children with hearing impairment (Mukari, Ahmad, Saim, & Mohamed, 1997; Mukari, Vandort, Ahmad, & Saim, 1999). In 2007, results from a national survey of ear and hearing disorders revealed that only 22.8% of those who were informed of their hearing impairment or felt that they have hearing impairment sought help (Ministry of Health Malaysia, 2007). The demographics of these help seekers were not described, therefore the prevalence of Malaysian adult help-seekers is unknown.

The reasons for the low levels of help-seeking in the Malaysian survey were not described. The factors that affect help seeking behaviour reported in studies from other countries may not apply to the Malaysian population due to population differences, such as culture. Cultural differences have been identified to contribute to health related decisions (Kricos, 2000). Malaysia is comprised of three main ethnic groups, i.e. Bumiputera (67.4%), Chinese (24.6%), and Indians (7.3%) (Department of Statistics Malaysia, 2010). Amongst Bumiputera, Malays make up the majority ethnic group (63.1%) followed by other minority ethnic groups in East Malaysia, which are the Iban (30.3%) and Kadazan/Dusun *(*24.5%). These ethnic groups have different health beliefs, perception and practices relating to health as discussed by Ariff and Beng (2006). In their article, they described how these beliefs lead to use of many traditional health services and stressed that health professionals should be attentive to these cultural influences in order to improve care and health outcomes. However, this article

was written based on professional opinions with no specific studies on effects of cultural beliefs on any particular treatment option or outcomes.

Another factor that could contribute to Malaysian adult rehabilitation decision is the audiological service delivery system. In Malaysia, the government provides funding for hearing aids to a restricted group of people such as children with disabilities, civil servants (and their dependents) and retired government employees. Others may request funding from their insurance companies, Social Security Organisation (SOCSO) or the State Islamic councils and small number of NGOs. As previously described, the cost of hearing aids may contribute to hearing aid uptake. In the United Kingdom for example, hearing aids are fully funded by the National Health Service (NHS) and therefore cost does not serve as a barrier (Humphrey et al., 1981 as cited in Knudsen et al., 2010). However the hearing aid uptake rate in the UK (Smeeth et al., 2002) is similar to the rates in the US (Kochkin, 2007) where there are no government subsidies for hearing aids. Therefore, there is a need to identify if service delivery has an effect on hearing aid uptake, as well as other contributing factors within the Malaysian context.

2.9 Study rationale

The National Survey on Ear and Hearing Disorders conducted in Malaysia (Ministry of Health Malaysia, 2007) has provided much needed information regarding the prevalence of hearing impairment and help seeking behaviour of hearing impaired Malaysians. The result of this study revealed that the prevalence of hearing impairment increases with age and more than two thirds of the participants who were informed or felt that they have hearing impairment did not seek treatment. However, there are other relevant information that is not available such as the prevalence of help-seeking adults with hearing impairment and hearing aid uptake. Based on personal experience and previous communications with colleagues, it is likely that amongst those who seek audiological assessment or their hearing problems, only half actually proceed with amplification after consultation.

Evidence of factors influencing rehabilitation decision is vast and readily available (section 3.1). However, it cannot be assumed that the factors identified apply to Malaysian adults. The influencing factors may be different for Malaysian adults as different cultures, health beliefs, social support, and service delivery are related to internal and external factors affecting rehabilitation decisions. This notion is supported by Zhao et al. (2015) in their recent paper which discussed and highlighted differences in health care systems, audiological services, and culture in the United Kingdom, Sweden, India, and China that influences health behaviours. From the clinical perspective, the outcome of this investigation could help clinicians to develop an aural rehabilitation programme that is patient oriented and evidence-based. By identifying the external factors, this investigation could potentially contribute to some changes to the audiological service delivery system in Malaysia.

2.9.1 Statement of problem

Malaysian adults with acknowledged hearing impairments may choose to take different decision approaches upon diagnosis of the hearing impairment. Following hearing consultation, the person diagnosed with hearing impairment may choose to: 1) do nothing, 2) proceed to a hearing aid demonstration, 3) do nothing following receiving hearing aid demonstration, or 4) proceed with amplification following hearing aid demonstration. The reason for these rehabilitation decisions has never been investigated in Malaysia.

2.9.2 Study aims

It is the overall aim of the study to investigate factors that serve as motivators and barriers to hearing aid uptake amongst adults with hearing impairment within the Hospital Sungai Buloh and Hospital Tengku Ampuan Rahimah, in the Klang Valley, Malaysia. In order to achieve this aim, the following objectives were set:

1) To describe the audiometric and demographic profiles of adults consulting for audiological services in the Hospital Sungai Buloh and Hospital Tengku Ampuan Rahimah.

2) To explore the internal and external factors perceived to influence hearing aid uptake amongst adults with hearing impairment within the Hospital Sungai Buloh and Hospital Tengku Ampuan Rahimah.

3) To apply the WHO's ICF terminologies in describing the internal (*personal* in ICF terminology) and external (*environmental* in ICF terminology) factors that are perceived to influence hearing aid uptake amongst adults with hearing impairment within the public health sector in the Klang Valley, Malaysia.

Several research questions were developed during the analysis period of the interview transcripts to guide the analysis process (Agee, 2009) in order to address the above objectives (2) and (3), incorporating the relevant ICF terminologies:

1. What are the personal factors perceived to support hearing aid uptake?
2. What are the environmental factors perceived to support hearing aid uptake?
3. What are the personal factors perceived to hinder hearing aid uptake?
4. What are the environmental factors perceived to hinder hearing aid uptake?

When analysing the second interview transcripts, an additional research question was added:

5. Are there any changes to the factors perceived to support or hinder hearing aid uptake within participants following hearing aid demonstration?

CHAPTER 3

PART I METHODS

3.1 Introduction

Part 1 of this study involved a quantitative study method to address the objective of obtaining demographic and audiometric data of Malaysian adults who consulted for audiological services in two public hospitals in the Klang Valley, Malaysia. This is the first part of a sequential quantitative-qualitative mixed method research design (Giddings & Grant, 2006) that was selected to achieve the overall aim of this research. In a sequential mixed method design, one method is used first, followed by the other in order to explain, elaborate, or expand the findings from the first study. Currently, the demographic and hearing profiles of help-seeking Malaysian adults with hearing impairment are unknown. The results of the analysis from the quantitative study were used to guide the choice of sampling criteria for the second qualitative part of this investigation.

3.2 Study design

A retrospective cohort study design was selected for this part of the study. This design was chosen as the study was conducted over a designated period of time and used to describe the profiles of the group of subjects of interest (Healy, 2011). In this study the cohort of interest consisted of adults who had sought audiological service for the first time at two public hospitals. The information of interest was demographic and audiological profiles, including patients' decisions on hearing aid uptake following hearing aid recommendation by audiologists. These data were collected from the patients' hospital records at the records

department of each hospital by the hospital audiologists. The information was provided on de-identified forms (appendix A) and collected by the researcher for analysis.

3.3 Sampling

Patient demographic and audiological data were obtained from two public hospitals within the Klang Valley, Malaysia: 1) Hospital Sungai Buloh and 2) Hospital Tengku Ampuan Rahimah, Klang. The Klang Valley comprises the Federal Territory of Kuala Lumpur and its suburbs, and extends to an area governed by local authorities in nine municipalities within the state of Selangor including the Federal Territory of Putrajaya ("Greater Kuala Lumpur / Klang Valley," 2015). The area of Klang Valley extends from the Rawang municipality in the north, to the Sepang municipality in the south and from the Klang municipality in the west to the Kajang municipality in the east, as shown in Figure 3.1. There are eight public and university hospitals located within the Klang Valley. The Klang Valley was selected as a number of the local authority areas where the hospitals are located have similar population sizes and compositions (Department of Statistics Malaysia, 2010). The Hospital Sungai Buloh (henceforth referred to as HSB) and Hospital Tengku Ampuan Afzan, Klang (henceforth referred to as HTAR) were approved by the Ministry of Health Malaysia to be the locations for data collection.

The inclusion criteria for sampling were Malaysian adults who: 1) were aged 18 years and above and 2) had attended audiological assessment at the hospital audiology clinics for the first time. The definition of “adults” as those aged 18 years and above is adopted by the Malaysian public health service in accordance to the Child Act 2001, which defines a “child” as a person under the age of 18 years.

The exclusion criteria were adults who: 1) were identified in the record as having a nationality other than Malaysian and 2) had been to the audiology clinic for reasons other than an initial audiological assessment.

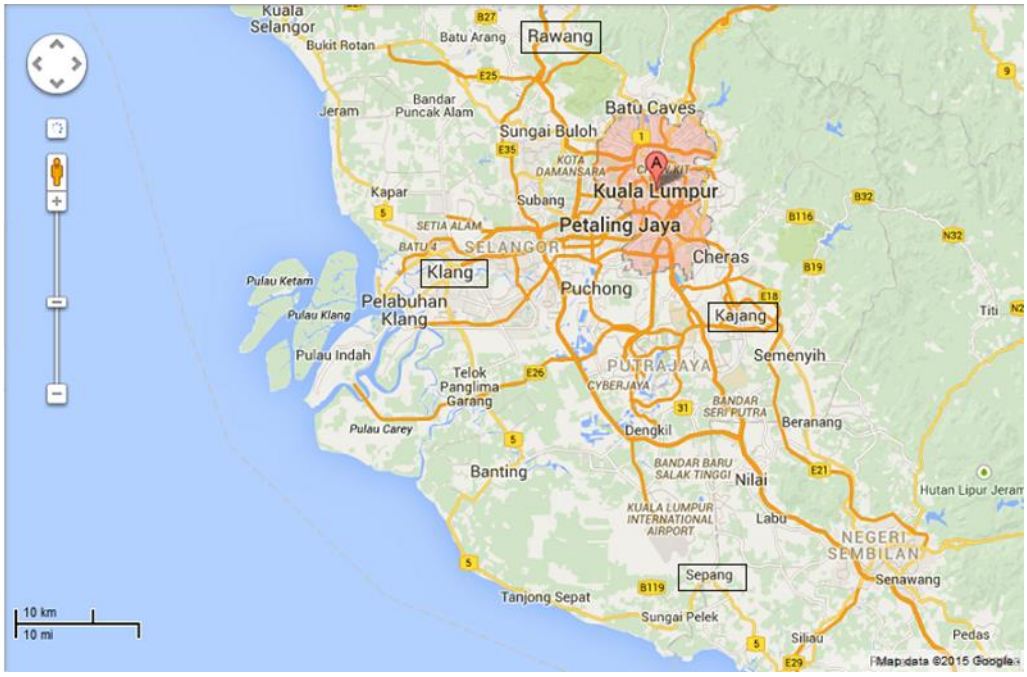

Figure 3.1 Map of areas within the Klang Valley, Malaysia (source: Google Maps)

3.4 Procedures and Materials

In order to conduct research in Malaysia, an approval needed to be obtained from the Economic Planning Unit of the Prime Minister's Department of Malaysia. The Economic Planning Unit liaised with the Ministry of Health (MOH), Malaysia, for decision on the research conduct application. At the same time, an online registration was made with the National Medical Research Register (NMRR). The NMRR, which is under the purview of the National Institute of Health (NIH) of the MOH, is a web-based service designed to support the implementation of the NIH guideline on research conduct in the MOH institutions or facilities. Under the NIH guideline, all research to be conducted in the facility of the MOH is

required to be: 1) registered in the NMRR, 2) reviewed and approved by the relevant departmental and institution head, to whom authority has been delegated by MOH, and 3) reviewed and approved by the MOH Research and Ethics Committee (MREC) where human participants are involved. Additionally, any forms of publication resulting from the research would require approval by NIH initially, and thereafter the Director General of MOH (National Medical Research Register, 2006).

To fulfil the second requirement, a thorough discussion about the feasibility of the research method was made with the Audiology Working Committee of the MOH. Upon agreement, HSB and HTAR were selected to be the locations for data collection and two audiologists from in each hospital were assigned as site investigators to assist in data collection. Each of the site investigators was required to sign an Investigator Agreement form and obtain approval from their departmental and institution head. These signed forms were uploaded on the NMRR. Subsequently, application for ethics approval by the MREC was made through the NMRR and approved (Appendix B). Approval from the Economic Planning Unit was received upon fulfilling the terms of research conduct set by the MOH. Ethical approval was also obtained from the University of Canterbury Human Ethics Committee (Appendix C).

The audiological and demographic data were extracted from the patient hospital records and recorded on de-identified forms (Appendix A). The patient hospital records were reviewed by the hospital audiologists to maintain patient confidentiality. The audiological data consisted of audiometric information and rehabilitative decision following a hearing aid recommendation by audiologists. The audiometric data included air conduction and bone conduction hearing thresholds at octave frequencies 0.25, 0.5, 1, 2, 4 and 8 kHz, and rehabilitative information, which included hearing aid recommendation and uptake. The

demographic data obtainable from the patient hospital records were age, gender, and ethnicity.

The earliest hospital record viewed was of patients seen three months prior to the date of data collection. This was decided after consultation with the hospital heads of audiology and was based on the nature of the audiology service delivery system. The audiology service arranged for a hearing consultation appointment upon detection of hearing impairment and the waiting list could take up to 3 months. The information about decision on hearing aid uptake was only obtainable after the completion of the hearing aid demonstration. After establishing a date from which the records of new patients were to be viewed, the selection of patient hospital records was carried out systematically backward in time from the assigned date of commencement until the target number of data points was reached. Only records of patients who attended audiology appointment for the first time were selected. Records with missing demographic information were omitted.

At the time of data collection, each hospital was utilising a different hospital information system as the MOH was in the process of upgrading the system from a paper-based to an online-based system across all of its public hospitals. HSB was one of the pioneering public hospitals in the implementation of the online-based system. Due to some technical difficulties in the online system, data collection in HSB and HTAR could not be carried out at the same time. Data collection at HSB commenced 6 months later than that of HTAR, after the technical difficulty was resolved. Data obtained from hospital records were of patients seen in the audiology clinics at HSB and HTAR between the 18th January 2014 and 28th March 2014, and 19th April 2013 and 30th July 2013, respectively.

3.5 Statistical analysis

Due to the different time of data collection between HSB and HTAR, analysis for data obtained from each hospital were analysed separately. Descriptive analysis was used to describe the audiologic and demographic profiles of first-time hearing consulters in the two hospitals. Differences in the distribution of hearing impairment across age (as presented in subheadings 4.2.1.2 and 4.2.2.2) between each hospital supported the decision to perform separate analyses for the two hospital. Chi-square test was performed to establish information that served to guide the sampling criteria for Part 2 of this study. Data were analysed using the IBM SPSS Statistic software version 20.

3.5.1 Descriptive analysis

The age, gender, and ethnicity data from each hospital were analysed and comparisons were made descriptively between each hospital. The age of participants was grouped into seven categories according to range values of 10 years. Ethnicity was grouped into four categories: 1) Malay, 2) Chinese, 3) Indian, and 4) others.

Hearing thresholds were calculated as pure tone averages (PTA) of 0.5, 1, 2, and 4 kHz (Ministry of Health Malaysia, 2007), and describe as separate ear information. The hearing levels were defined according to the MOH classification as it is the main standard for hearing impairment in Malaysia. The definition can be referred to in sub-heading 2.1.1.

The overall prevalence of hearing impairment for each hospital was calculated as well as prevalences based on age groups, gender, and ethnicity.

3.5.2 Chi-square test

Chi-square tests were performed to investigate whether the prevelences of hearing impairment were independent of age groups, gender, and ethnicity. These relationships served as a guide to sampling criteria for Part 2 of this study. The variable found to be independent of hearing impairment was excluded from the sampling criteria. For the variable that was found to be not independent of hearing impairment, the category/s in which the majority of occurrences were observed was/were accepted as a sampling criteria for Part 2.

CHAPTER 4

PART I RESULTS

4.1 Introduction

This chapter provides the results of the Part 1 quantitative study, which was conducted to describe the demographic and audiological data of Malaysian adults who consulted for audiological services in the HSB and HTAR. One hundred data points were collected from each hospital representing adults who consulted for audiological services for the first time. The demographic information and audiological data are presented descriptively, and the overall prevalence of hearing impairment amongst the hearing consulters for each hospital calculated. Chi-square tests of independence were performed on the prevalence of hearing impairment based on age groups, gender, and ethnicity, in order to provide information for the sampling criteria for the Part 2 study.

4.2 Results

4.2.1 Hospital Sungai Buloh (HSB)

4.2.1.1 Demographic data

There was almost an equal number of men (51%) and women (49%) in the sample. The ethnicity of the majority of the adults was Malay (67%), followed by Indian (20%), and Chinese (13%). Overall, the largest number of the adults was in the age group of 50-69 years with the fewest number of adults in the age group 80 years and above. The age groups that made up the majority of the adults (57%) were in between 40 and 69 years. Tables 4.1 and 4.2 each shows the distribution of adults who sought audiological services by age and gender, and by age and ethnicity respectively, in numbers and percentage of consulters falling into each age group.

Table 4.1. Distribution of adults who consulted for audiological services in HSB by age and gender

Age	Gender		
	Male (%)	Female (%)	Total (%)
18 to 29	9 (17.6)	9 (18.4)	18 (18)
30 to 39	7 (13.7)	9 (18.4)	16 (16)
40 to 49	9(17.6)	10 (20.4)	19 (19)
50 to 59	15 (29.4)	6 (12.2)	21 (21)
60 to 69	8 (15.7)	9 (18.4)	17 (17)
70 to 79	2 (3.9)	5 (10.2)	7 (7)
≥80	1 (2)	1 (2)	2 (2)
Total	51	49	100

Table 4.2. Distribution of adults who consulted for audiological services in HSB by age and ethnicity

Age	Ethnicity			
	Malay (%)	Chinese (%)	Indian (%)	Total (%)
18 to 29	12 (17.9)	2 (15.4)	4 (20)	18 (18)
30 to 39	14 (20.9)	1 (7.7)	1 (5)	16 (16)
40 to 49	13 (19.4)	4 (30.8)	2 (10)	19 (19)
50 to 59	14 (20.9)	2 (15.4)	5 (25)	21 (21)
60 to 69	11 (16.4)	2 (15.4)	4 (20)	17 (17)
70 to 79	2 (3)	1 (7.7)	4 (20)	7 (7)
≥80	1 (1.5)	1 (7.7)	0	2 (2)
Total	67	13	20	100

From Table 4.2, it is observed that within each ethnicity, the majority of adult consulters were at different age groups. Amongst the Malay consulters, the majority (61.2%) were between the ages of 30 and 59 years; the majority of the Chinese consulters (61.6%) were between the ages 40 and 69 years, while the majority of the Indian consulters (65%) were older compared to Malay and Chinese consulters.

Although almost equal distribution of gender was found in the sample, there was an unequal distribution of gender amongst the adult consulters across the ethnicities as shown in Table 4.3. The Chinese (30.8%) and Indian (35%) women made up of about half of their male counterparts (Chinese men: 69.2%; Indian men: 65%), while more Malay women (56.7%) consulted for audiological services than the Malay men (43.3%). However, there is no significant interaction between the distribution of gender by ethnicity ($\chi 2$ (2) = 4.89, $p > 0.05$).

Table 4.3 Distribution of adults who consulted for audiological services in HSB by gender and ethnicity

Gender	Ethnicity			
	Malay (%)	Chinese (%)	Indian (%)	Total (%)
Male	29 (56.9)	9 (17.6)	13 (25.5)	51 (100)
Female	38 (77.6)	4 (8.2)	7 (14.3)	49 (100)
Total	67	13	20	100

The distribution of men and women across age groups varied across ethnicities as illustrated in Figure 4.1, Figure 4.2 and Figure 4.3. It can be seen that the distribution of men and women varies within the ethnicities. The Malay female consulters outnumber the Malay male consulters in the lower age ranges (18 - 49 years) while the majority of the male participants were in the higher age ranges (50 - 69 and 80 and above). For the Chinese consulters, most of the men were in the 40 to 69 age range, while most of women consulters were in the higher age range (60 - 69 and 80 and above). The number of Indian male consulters peaked in the 50 to 59 and 60 to 69 age ranges, while the Indian female consulters were mostly at the 70 to 79 age range. These differences could not be tested as the number of counts in the age groups for each ethnicity is insufficient to run a Chi-square test.

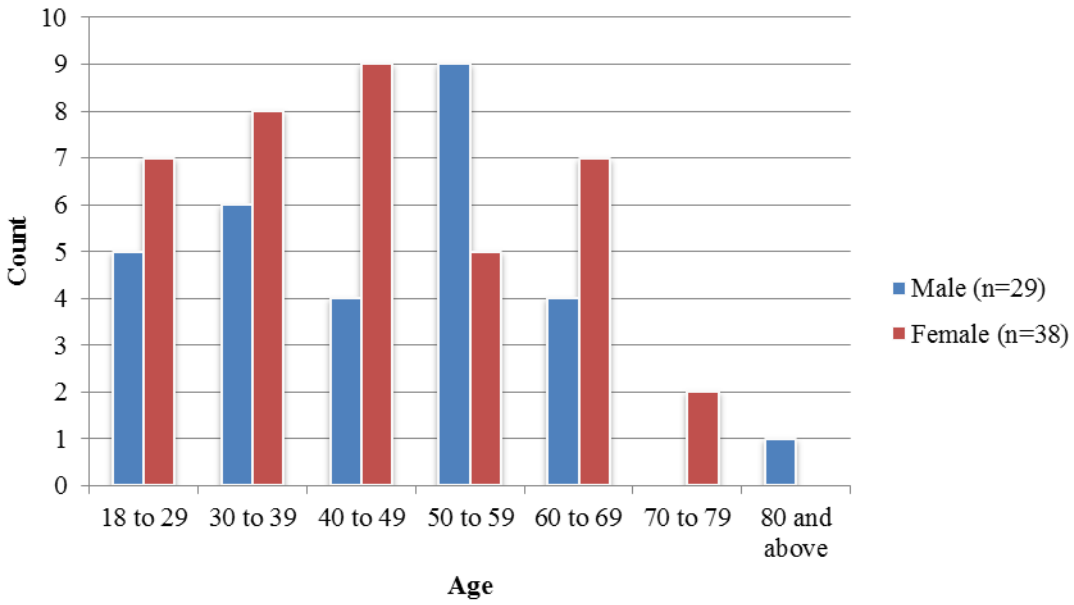

Figure 4.1 Distribution of ethnic Malay consulters by age and gender

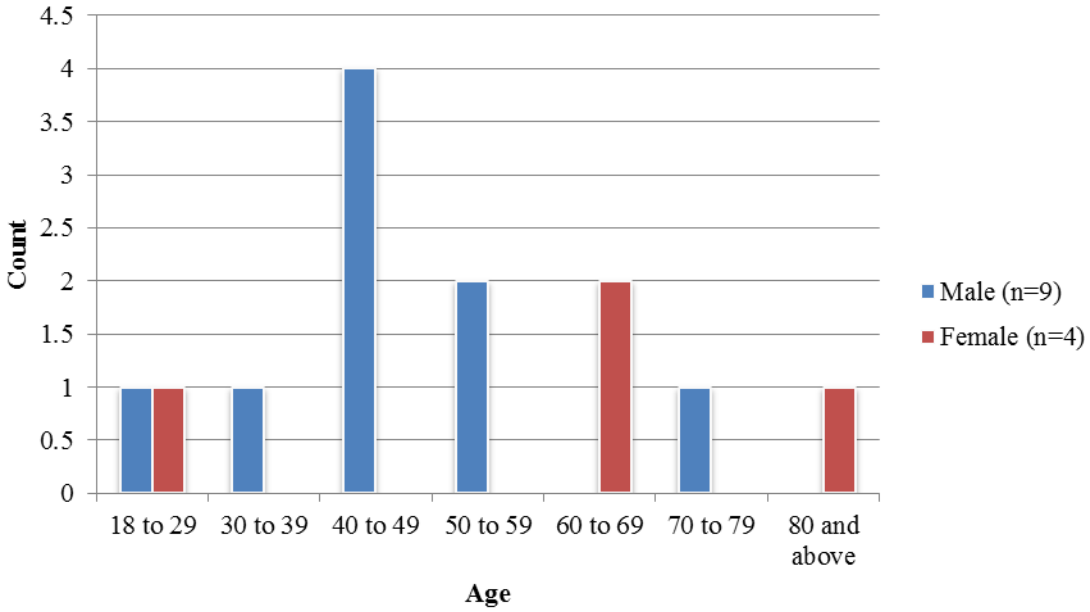

Figure 4.2 Distribution of ethnic Chinese consulters by age and gender

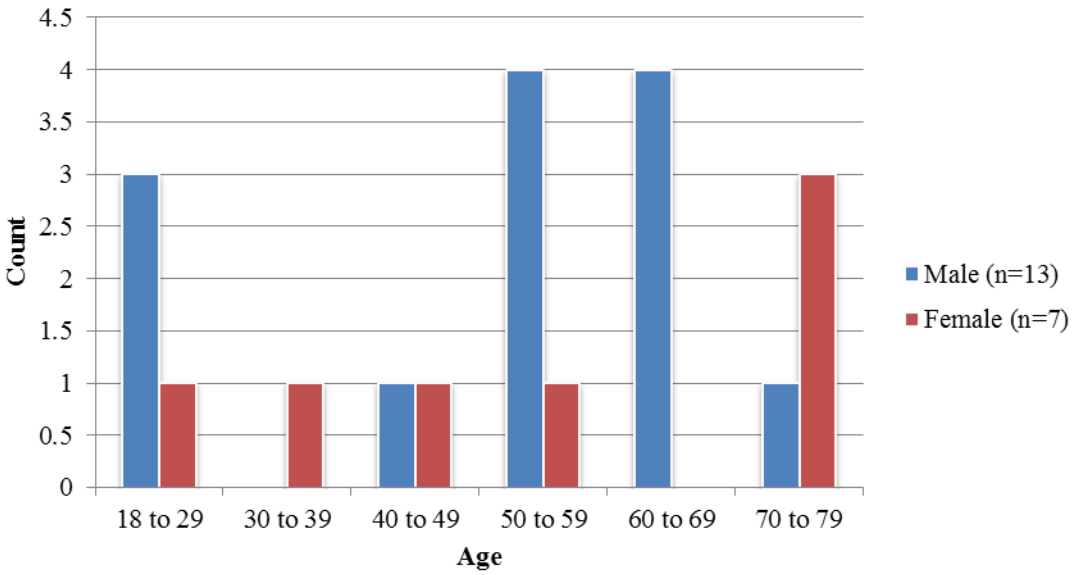

Figure 4.3 Distribution of ethnic Indian consulters by age and gender

4.2.1.2 Audiological data

The audiological data revealed 28% of the consulters have normal hearing, and 72% of the consulters had PTA thresholds of greater than 20 dB HL at least in one ear, with more men (54%) having hearing impairment than the women (46%). The relationship between gender and hearing impairment however, is not significant ($\chi 2$ (1) = 1.03, $p > 0.05$). Amongst adults with hearing impairment, 47% (n=34) had unilateral hearing impairment and 53% (n = 38) had bilateral hearing impairment. The hearing impairment can be described in terms of type and severity. For the description of the type of hearing impairment, each ear was described separately, for a total of 200 ears. The percentages of ears with normal hearing, and sensorineural (SNHL), conductive (CHL) and mixed (MHL) hearing impairments are shown in Figure 4.4. The number of normal hearing ears was high (n = 90) due to the large number of participants with unilateral hearing impairment.

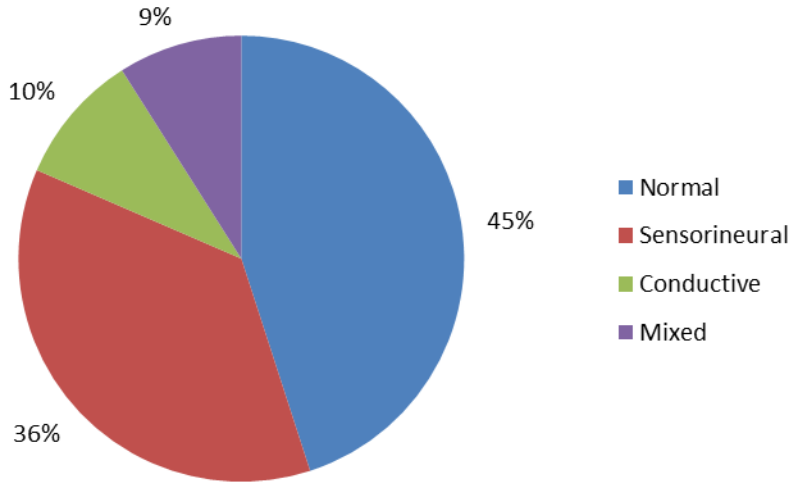

Figure 4.4 Distribution of normal hearing and the three types of hearing impairment in 200 ears

The severity of hearing impairment is described by categorising the PTA thresholds into five levels of hearing impairment based on the classification used in the audiology services of the MOH (Perkhidmatan Audiologi KKM, 2014b), and the five levels of hearing impairment classified by the WHO (2016c). For both classifications, the better ear PTA thresholds from the data points with bilateral hearing impairments, and the worse ear hearing thresholds from the data points with unilateral hearing impairments were selected to describe the hearing impairment as defined by the WHO (World Health Organisation, 2016b). Figure 4.5 shows the distribution of hearing impairment obtained using the classifications. The prevalence of hearing impairment amongst consulters was 72% when using the MOH classification, and was 58% when using the WHO classification. By using the MOH classification, more consulters were identified as having mild hearing impairment than with the WHO classification (38% compared to 23%), and fewer consulters identified with severe and profound hearing impairments (6% compared to 12%).

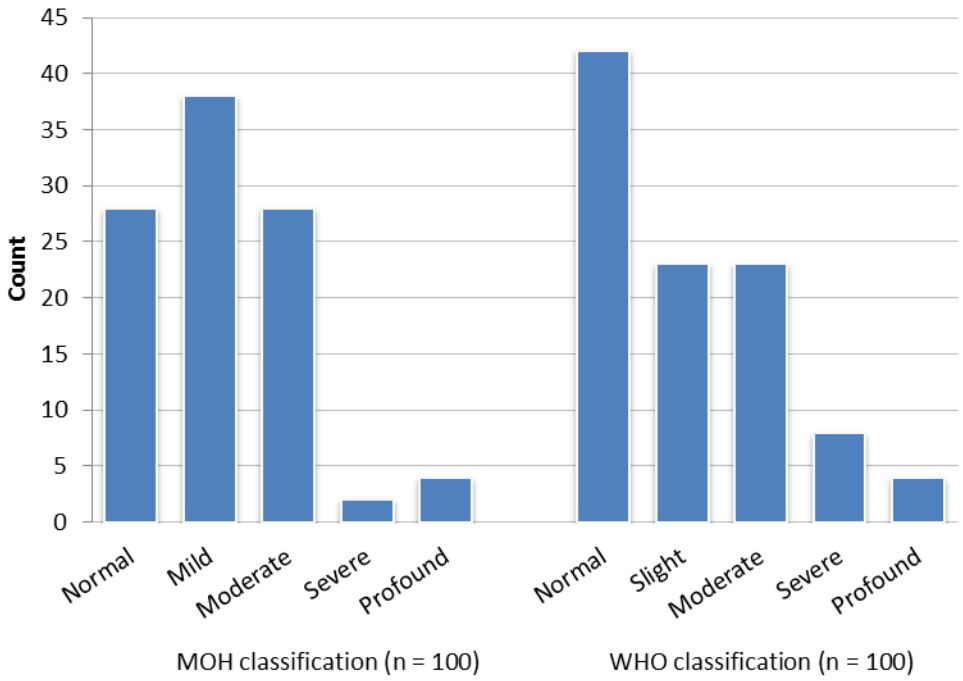

Figure 4.5 Distribution of hearing impairment (PTA over 0.5, 1, 2, 4 kHz) in the better ear for the adult consulters based on the MOH and WHO classifications

The prevalence of unilateral hearing impairment amongst adult consulters was 34% and bilateral hearing impairment was 38% when using the MOH classification of hearing impairment. These values are higher than the prevalence obtained when using the WHO classification, as shown is Figure 4.6.

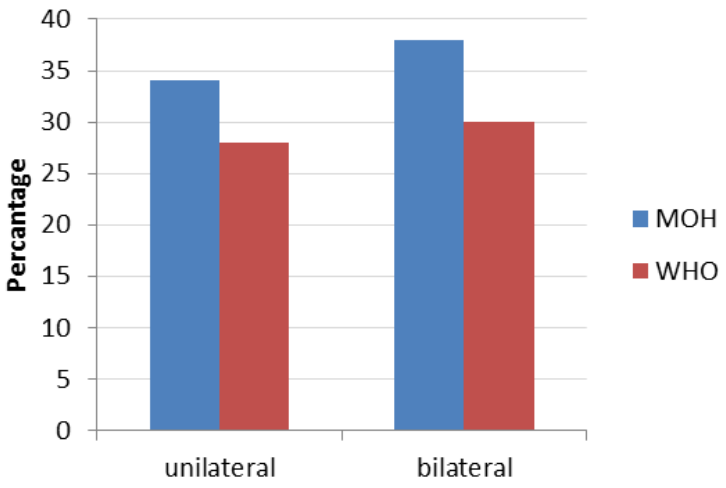

Figure 4.6 Prevalence of hearing impairment by MOH and WHO classifications of hearing impairment

The distribution of hearing impairment across age, gender, and ethnicity are presented in Figures 4.7 to 4.9. From here on, the MOH classification was used to categorise the hearing impairments. The majority of adult consulters with hearing impairment (55.6%, n=40) were aged between 40 and 69 years old where the prevalence of hearing impairment was highest within the age group of 50-59 years (21%). There were almost equal numbers of male and female consulters with hearing impairment (prevalence of 39% and 33% respectively). Mild and moderate hearing impairment were equally prevalent between the male and female consulters with hearing impairments (37% and 39%, respectively). The consulters of Malay ethnicity accounted for the highest prevalence of hearing impairment (45%), with mild hearing impairment being the most prevalent (38%) degree of hearing impairment.

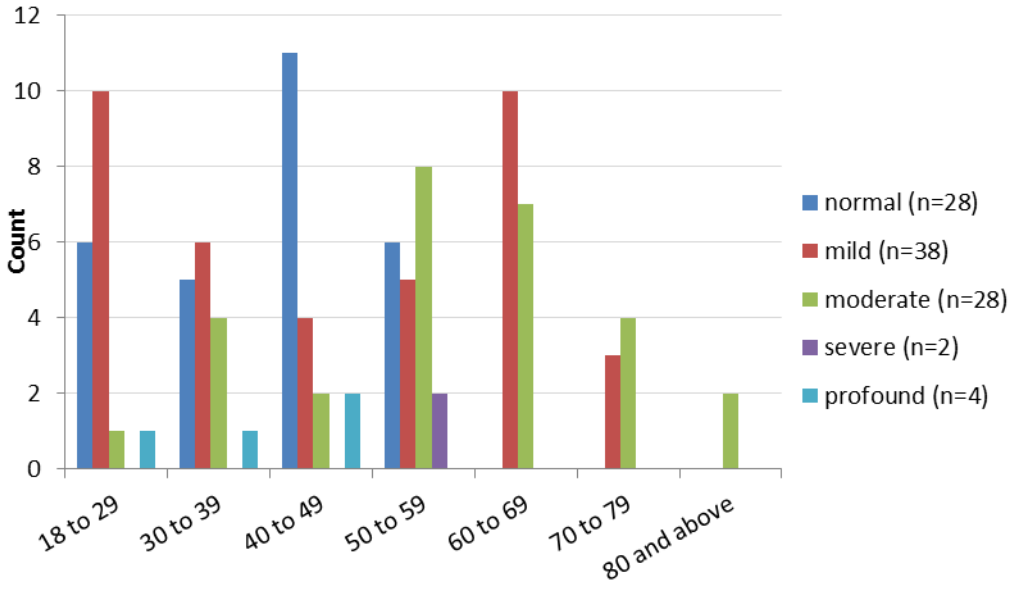

Figure 4.7 Distribution of hearing impairment across age using the MOH classification

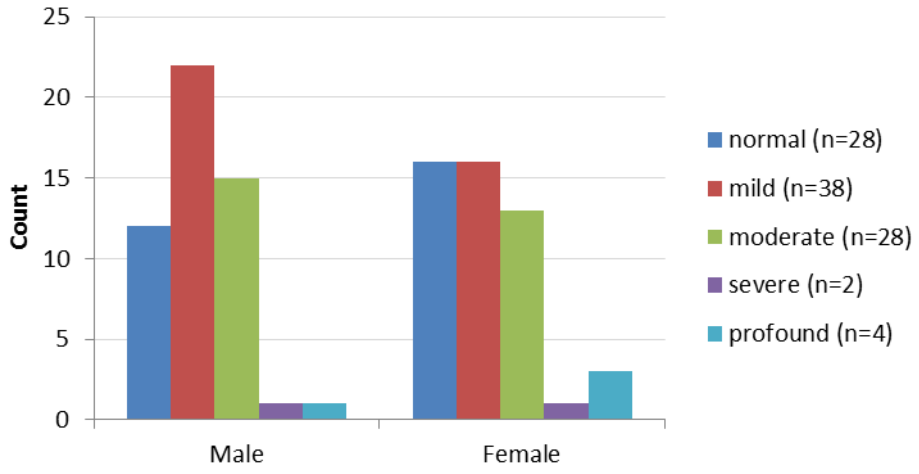

Figure 4.8 Distribution of hearing impairment across gender using the MOH classification and better ear PTA thresholds

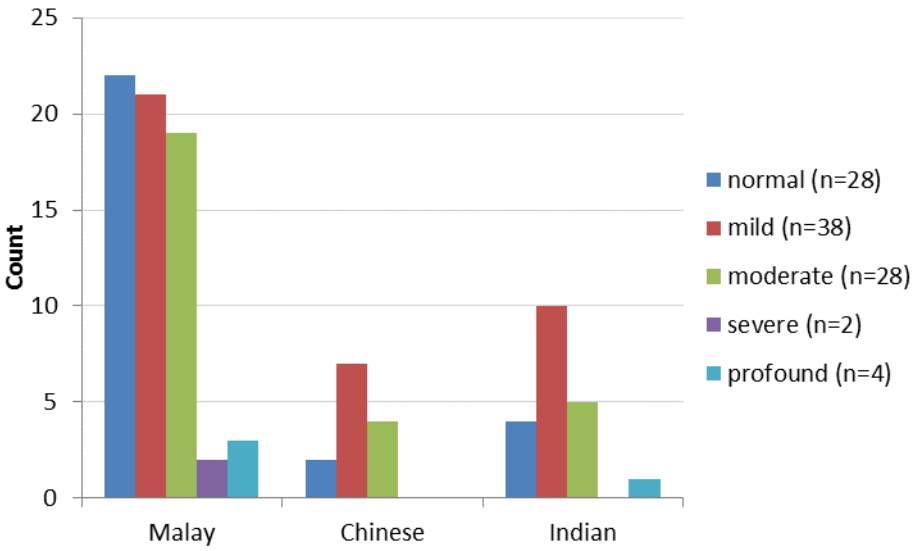

Figure 4.9 Distribution of hearing impairment across ethnicity using the MOH classification and better ear PTA thresholds

Hearing aid recommendations were given to 17 out of the 72 adults with hearing impairment as presented in Table 4.4. Five adults accepted the recommendation, making the hearing aid uptake rate 29.4%. Two out of the five consulters who were recommended hearing aids had unilateral hearing impairment and both accepted the recommendations. It was observed that all of the hearing aid non-adopters (70.6%) had bilateral hearing impairment.

Table 4.4. Distribution and percentage of adults accepting hearing aid recommendation by the type of hearing impairment

Hearing impairment	Numbers of hearing aid uptake	
	Yes (%)	No (%)
Unilateral	2 (100)	0
Bilateral	3 (20)	12 (80)
Total	5 (29.4)	12 (70.6)

The relationship between prevalence of hearing impairment and age groups, gender, and ethnicity were tested using the chi-square test of independence in order to provide information to guide the selection criteria for recruiting participants in the Part 2 qualitative study. A significant relationship was found (χ^2 (6) = 24.81, $p < 0.05$) between prevalence of hearing impairment and age. Therefore, the age group (or groups) that made up the majority of the consulters became a criterion for the Part 2 participant selection. No significant relationship was found (χ^2 (1) =1.03, $p > 0.05$) between the prevalence of hearing impairment and gender, and the same was found ((χ^2 (2) = 2.44, $p > 0.05$) between prevalence of hearing impairment and ethnicity.

As there was no significant difference in the prevalence of hearing impairment between male and female consulters, the gender variable was not considered as a criterion for the Part 2 sampling. There was also no significant difference in the prevalence of hearing impairment between the different ethnic groups, however due to the complexity of the cross-language research this variable was given a special consideration. As the primary investigator is of Malay ethnicity, concerns emerged regarding possible cultural and language barriers with the participants of Chinese and Indian ethnicities. Hence, Malay ethnicity was included as a criterion for the sampling of participants in Part 2.

4.2.2 Hospital Tengku Ampuan Rahimah (HTAR)

4.2.2.1 Demographic data

During the period from which data were collected, there were more adult male consulters (59%) than adult female consulters (41%). The majority of the adults was Malay (45%), followed by Indian (32%), Chinese (23%) and Others (1%). Overall, the largest number of the adults was in the age group of 50-69 years, with fewest number of adults in the age group 80 years and above. The age groups that made up the majority of the adults (54%) were in between 50 and 69 years. Tables 4.5 and 4.6 each shows the distribution of adults who sought audiological services by age and gender, and by age and ethnicity respectively.

Table 4.5. Distribution of adults who consulted for audiological services in HTAR by age and gender

Age	Gender		
	Male (%)	Female (%)	Total (%)
18 to 29	3 (5.1)	5 (12.2)	8 (8)
30 to 39	7 (11.9)	5 (12.2)	12 (12)
40 to 49	7 (11.9)	4 (9.8)	11 (11)
50 to 59	13 (22.0)	18 (43.9)	31 (31)
60 to 69	17 (28.8)	6 (14.6)	23 (23)
70 to 79	11 (18.6)	0	11 (11)
≥80	1 (1.7)	3 (7.3)	4 (4)
Total	59	41	100

Table 4.6. Distribution of adults who consulted for audiological services in HTAR by age and ethnicity

Age	Ethnicity				
	Malay (%)	Chinese (%)	Indian (%)	Others (%)	Total (%)
18 to 29	7 (15.6)	0	1 (3.2)	0	8 (8)
30 to 39	5 (11.1)	3 (13)	4 (12.9)	0	12 (12)
40 to 49	6 (13.3)	0	5 (16.1)	0	11 (11)
50 to 59	13 (28.9)	7 (30.4)	10 (32.3)	1 (3.2)	31 (31)
60 to 69	7 (15.6)	8 (34.8)	8 (25.8)	0	23 (23)
70 to 79	6 (13.3)	3 (13)	2 (6.5)	0	11 (11)
≥80	1 (2.2)	2 (8.7)	1 (3.2)	0	4 (4)
Total	45	23	31	1	100

From Table 4.6, it was observed that the majority of adult consulters within the three main ethnicities (Malay, Chinese, and Indian) were at different age groups. The majority of the Malay consulters (57.8%) were between the ages 40 and 69 years while the majority of the Chinese consulters (65.2%), and the Indian consulters (68.1%) were in the same age groups of between 50 and 69 years.

Table 4.7 shows the distribution of adult consulters by gender and ethnicity according to the main ethnicities of Malay, Chinese, and Indian. The number of Chinese (47.8%) women consulters was about half of that of Chinese men (52.2%). There were fewer Malay (35.6%) and Indian (41.9%) women consulters than Malay (64.4%) and Indian (58.1%) male consulters. No significant interaction was found between distribution of gender and ethnicity ($\chi 2\ (3) = 2.79$, $p > 0.05$).

Table 4.7 Distribution of adults who consulted for audiological services in HTAR by gender and ethnicity

Gender	Ethnicity				
	Malay (%)	Chinese (%)	Indian (%)	Others (%)	Total (%)
Male	29 (49.2)	12 (20.3)	18 (30.5)	0	59 (100)
Female	16 (39)	11 (26.8)	13 (31.7)	1 (2.4)	41 (100)
Total	45	23	31	1	100

The distribution of age between the men and women also varied across ethnicities as illustrated in Figures 4.10 through 4.12. The majority of Malay men (55.1%) and women (62.6%) were in the same age groups between 40 and 69 years. Generally, the majority of Chinese and Indian men were older than their female counterparts. The majority of Chinese men (66.7%) were in between 69 and 79 years old compared to the women (72.8%) who were between 50 and 69 years, whereas the majority of Indian male consulters (66.7%) were aged between 50 and 69 years compared to the majority of Indian female consulters (61.6%). These differences could not be tested as the number of counts in the age groups for each ethnicity is insufficient to run a Chi square test.

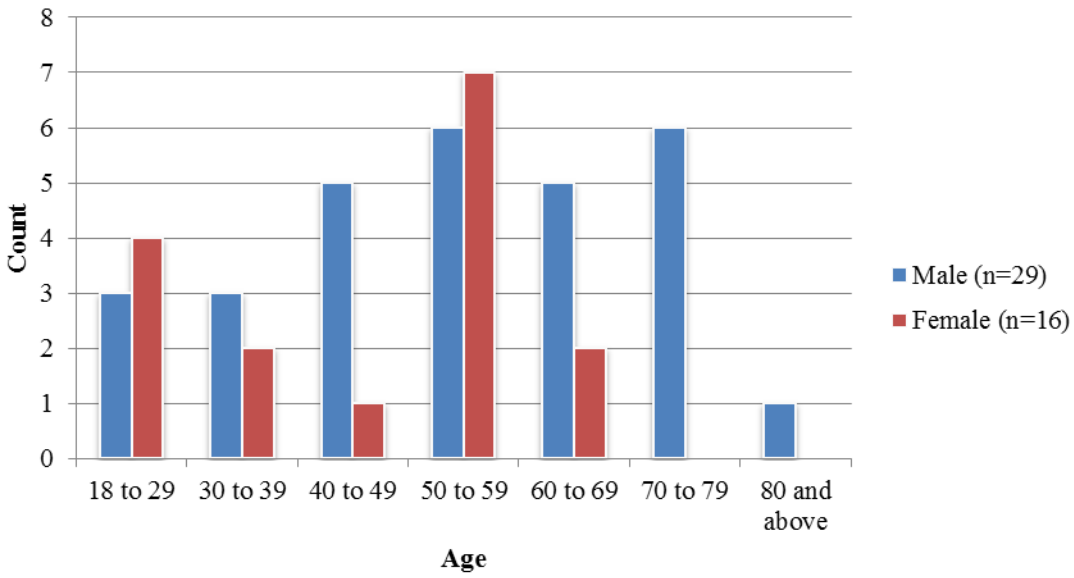

Figure 4.10 Distribution of ethnic Malay consulters by age and gender

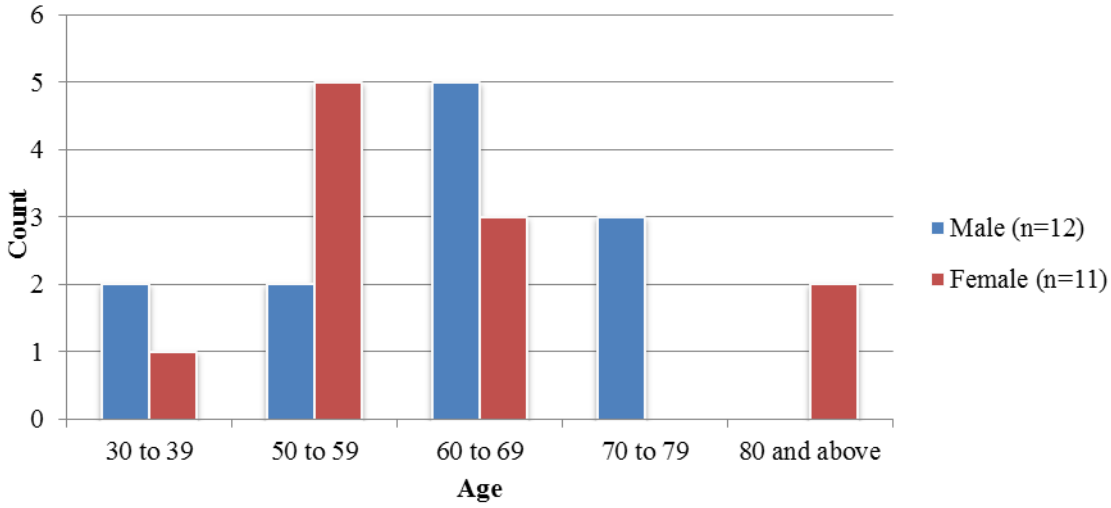

Figure 4.11 Distribution of ethnic Chinese consulters by age and gender

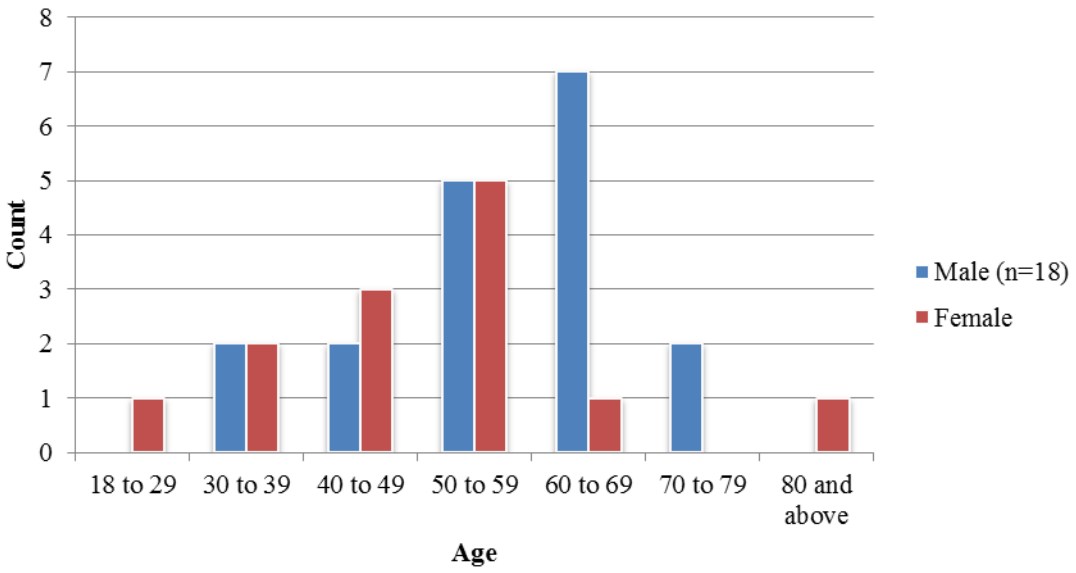

Figure 4.12 Distribution of ethnic Indian consulters by age and gender

4.2.2.2 Audiological data

The audiological data showed 24% of the adult consulters have normal hearing, and 76% of the adults had a PTA threshold of more than 20 dB HL at least in one ear, with more men (64.5%) having hearing impairment than the women (35.5%). However, there is no significant difference between the distribution of gender and hearing impairment ($p = 0.06$: Fisher Exact Test). Amongst adults with hearing impairment, 13.2% (n=10) had unilateral hearing impairment and 86.8% (n = 66) had bilateral hearing impairment. The hearing impairment was described separately, in terms of type and severity, for a total of 200 ears. Figure 4.13 shows that 71% of the ears had either a sensorineural, conductive, or mixed types of hearing impairment. Sensorineural hearing impairment was the most prevalent (n = 96) type of hearing impairment and the smallest percentage of the ears (n = 7) had conductive hearing impairment.

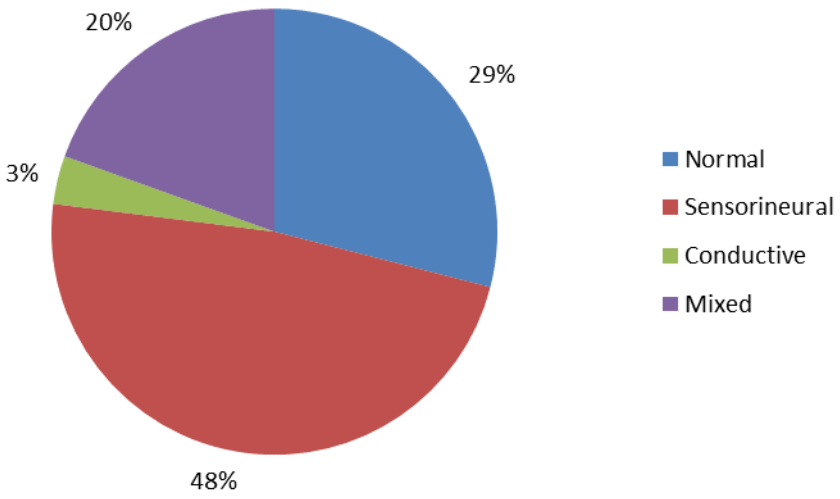

Figure 4.13 Distribution of normal hearing and the three types of hearing impairment in 200 ears

The severity of hearing impairment is described using the MOH and WHO classifications as mentioned in the section 4.2.1.2. Figure 4.14 shows the distribution of hearing impairment obtained using the classifications. The prevalence of hearing impairment amongst consulters was 76% when using the MOH classification, and 73% when using the WHO classification. Overall, there was a similar pattern of hearing impairment distribution when using the two classifications of hearing impairment.

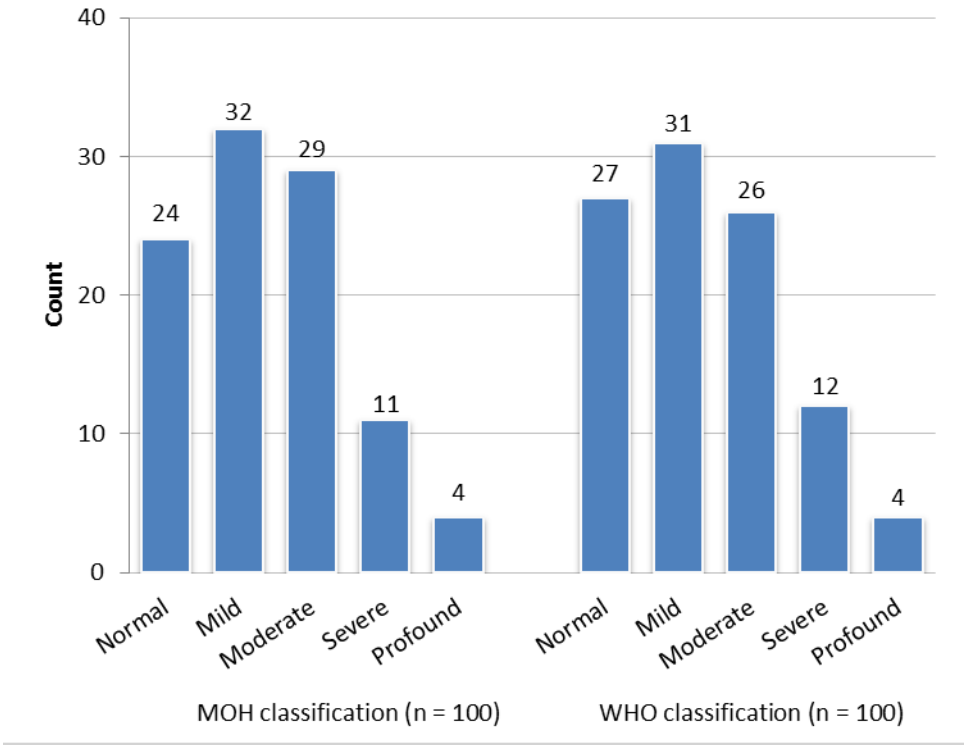

Figure 4.14 Distribution of hearing impairment (PTA over 0.5, 1, 2, 4 kHz) in the better ear for the adult consulters based on the MOH and WHO classifications

The prevalence (10%) of unilateral hearing impairment amongst the hearing consulters did not change whether the MOH or WHO classifications were used. Similar prevalence was calculated for the consultants with bilateral hearing impairment between the two classifications as presented in Figure 4.15.

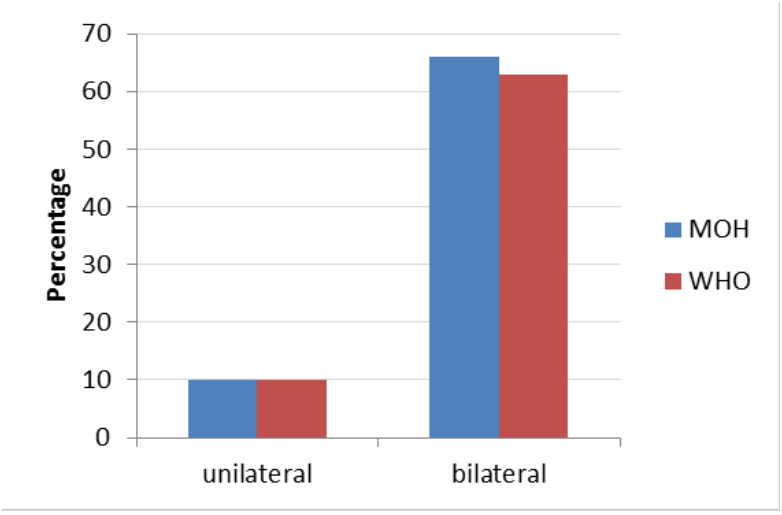

Figure 4.15 Prevalence of hearing impairment by MOH and WHO classifications of hearing impairment

The distribution of hearing impairment across age, gender, and ethnicity are presented in Figures 4.16 to 4.18. The majority of adult consulters with hearing impairment (59.2%, n=45) in the HTAR were between the ages of 50 and 69 years, with the highest prevalence of hearing impairment (31%) in the age group of 50-59 years. More men (49%) who consulted for audiological services had a hearing impairment than their female counterparts (27%). Moderate hearing impairment was more prevalent (22%) amongst the male consulters with hearing impairment while prevalence of mild hearing impairment (17%) was highest in the female group. The prevalence of hearing impairment amongst the Malay consulters (32%) was highest, followed by the Indian consulters (27%), and the Chinese consulters (16%).

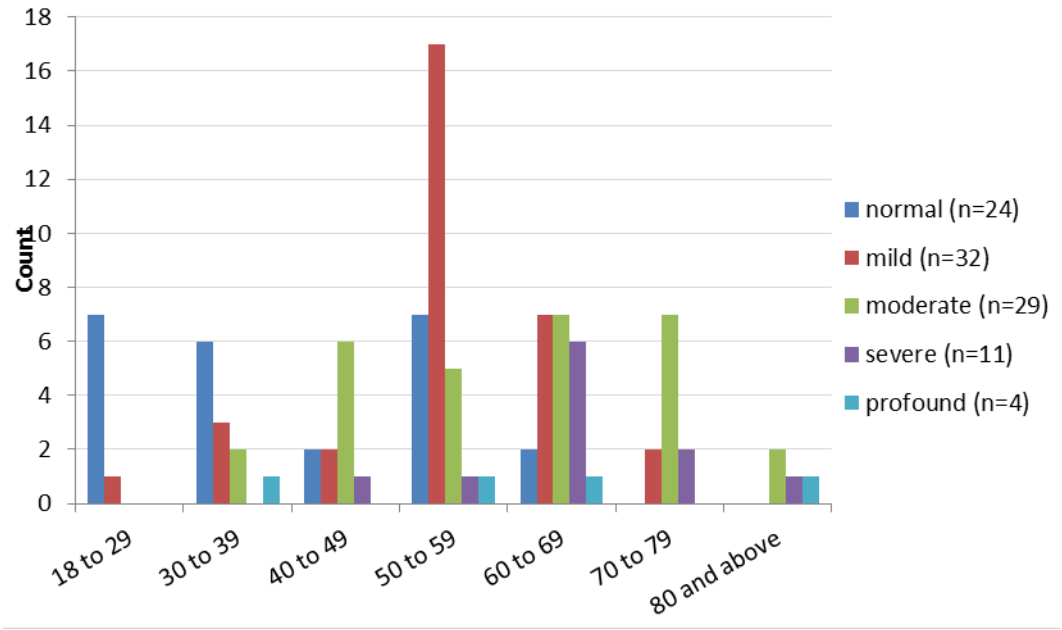

Figure 4.16 Distribution of hearing impairment across age using the MOH classification

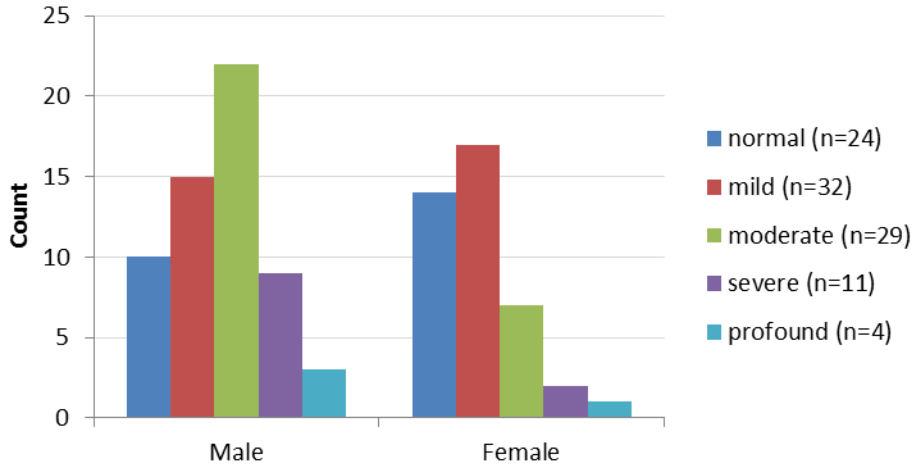

Figure 4.17 Distribution of hearing impairment across gender using the MOH classification

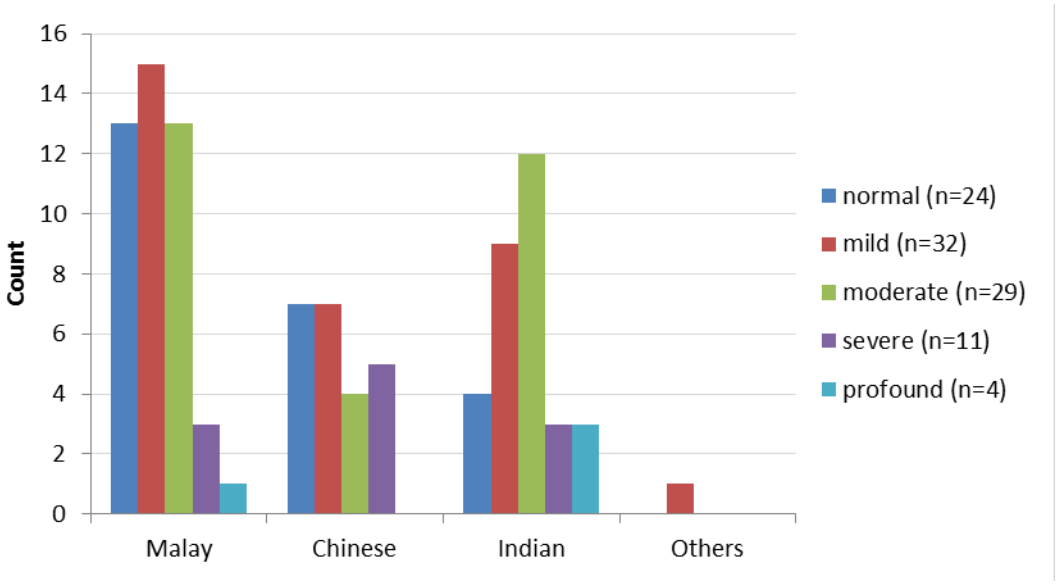

Figure 4.18 Distribution of hearing impairment across ethnicity using the MOH classification

Hearing aid recommendations were given to 49 out of the 76 adults with hearing impairment as presented in Table 4.8. Twenty-seven adults accepted recommendation resulting in a high hearing aid uptake rate of 55.1%. One of the hearing aid non-adopters had unilateral hearing impairment while the rest had bilateral hearing impairment, making the total percentage of non-adopters 42.9%.

Table 4.8. Distribution and percentage of adults accepting a hearing aid recommendation by the type of hearing impairment

Hearing impairment	Numbers of hearing aid uptake		
	Yes (%)	No (%)	Undecided (%)
Unilateral	0	1 (100)	0
Bilateral	27 (56.3)	20 (41.7)	1 (2)
Total	27 (56.1)	21 (42.9)	1(2)

The chi-square test of independence was carried out to discover any relationship between prevalence of hearing impairment and age groups, gender, and ethnicity. A significant relationship was found (χ^2 (6) = 30.06, $p < 0.05$) between prevalence of hearing impairment and age. Therefore, the age group (or groups) that made up the majority of the consulters became a criterion for the Part 2 participant selection. No significant relationship was found (χ^2 (1) =3.92, $p > 0.05$) between the prevalence of hearing impairment and gender, and the same was found (χ^2 (3) = 3.52, $p > 0.05$) between prevalence of hearing impairment and ethnicity. As there was no significant difference in the prevalence of hearing impairment between male and female groups, the gender variable was not considered as a criterion for the Part 2 sampling. There was also no significant difference in the prevalence of hearing impairment between the different ethnic groups, however due to the reasons mentioned in section 4.2.1.2, Malay ethnicity was included as a criterion for the sampling of participants at HTAR for the Part 2 qualitative study.

4.3 Summary

In both public hospitals the highest number of adult consulters was of the Malay ethnicity followed by Indian, and Chinese. At the HSB, men and women sought help equally; however more Malay women sought help than their male counterparts, whereas fewer Indian and Chinese female consulters were recorded compared to their male counterparts. Majority of the adult consulters with hearing impairment (55.6%) were aged between 40 and 69 years. The overall prevalence of hearing impairment was 72%, where the Malay consulters (45%) contributed the most to the figure compared to other ethnicities. There were more male consulters (54%) having hearing impairment than female consulters (46%). The prevalence of unilateral hearing impairment amongst adult consulters was 34% and the prevalence of bilateral hearing impairment was 38%.

Unlike the consulters in the HSB, more men (59%) consulted for audiological services at the HTAR than the women (41%). Fewer female consulters were recorded across all ethnicities. The age group between 50 and 69 years made up for majority of adult consulters with hearing impairment (59.2%). The Malay consulters contributed the most (32%) to the overall prevalence of hearing impairment (76%). There were also more male consulters with hearing impairment (64.5%) than their female counterparts (35.5%). The prevalence of unilateral hearing impairment amongst adult consulters with hearing impairment was 10% and the prevalence of bilateral hearing impairment was 66%.

Hearing aid uptake rate was calculated for each hospital. Out of seventeen consulters at the HSB who were recommended amplification, five accepted making the hearing aid uptake rate of 29.4%. Hearing aid uptake rate was higher (55.1%) at the HTAR.

Results from the chi-square test of independence provided the information needed to set the participant selection criteria for the Part 2 qualitative study. Significant relationship was found ($\chi 2$ (6) = 24.81, $p < 0.05$) between the prevalence of hearing impairment and age at the HSB, but no significant relationship was found ($\chi 2$ (1) =1.03, $p > 0.05$) between the prevalence of hearing impairment and gender, and ethnicity (($\chi 2$ (2) = 2.44, $p > 0.05$). The age group between 40 and 69 years which made up the majority of the hearing consulters was selected as a criterion. Gender was not considered as a criterion, but the ethnicity variable was given special consideration due to the Malay ethnicity of the primary investigator. In order to avoid possible cultural and language barriers during any in-depth interviews with potential participants from the Chinese and Indian ethnicities, the Malay ethnicity was selected as one of the criteria for participant recruitment. Therefore, the selection criteria for Part 2 participant recruitment at the HSB were adults:

1. who have been seen by audiologists for the first time in the public hospital,
2. for whom amplification had been recommended,
3. whose ethnicity was Malay, AND
4. who was between 40 and 69 years of age.

Chi-square test of independence carried out on data obtained at the HTAR, showed a significant relationship ($\chi 2$ (6) = 30.06, $p < 0.05$) between the prevalence of hearing impairment and age. Therefore, the age groups that made up the majority of the consulters became a criterion for the Part 2 participant selection. No significant relationship was found ($\chi 2$ (1) =3.92, $p > 0.05$) between the prevalence of hearing impairment and gender, and ethnicity ($\chi 2$ (3) = 3.52, $p > 0.05$). For the same reasons explained above regarding the

ethnicity variable, the ethnicity variable was considered as a selection criterion. Therefore, the selection criteria for participant recruitment at the HTAR were adults:

1. who have been seen by audiologists for the first time in the public hospital,
2. for whom amplification had been recommended,
3. whose ethnicity was Malay, AND
4. who was between 50 and 69 years of age.

CHAPTER 5

PART II METHODS

5.1 Introduction

Part 2 of this study involved a qualitative study method to address the aim of investigating factors influencing hearing aid uptake amongst Malaysian adults who consulted for audiological services in the HSB and HTAR. This is the second part of a sequential quantitative-qualitative mixed method research design that was selected to achieve the overall aim of this research (Giddings & Grant, 2006). Two-stage semi-structured in-depth interviews were conducted with participants who met the selection criteria established from Part 1, and who agreed to participate in this study. Stage 1 interviews were carried out following the participants' hearing assessment, while the stage 2 interviews were conducted following the participants' hearing consultation. Demographic information was sought prior to conducting the interview, and with consent from the participants, information about their hearing levels was obtained from their hospital file with the assistance of the hospital audiologists.

A qualitative approach has been selected for this phase of the investigation because this is an area of new exploration in Malaysia whereby important variables have not been identified yet. Interviews were conducted in the Malaysian Malay (henceforth referred to as Malay) language. However, because many Malaysians speak English as a second language, the interviewer followed the participant's lead whenever they chose to respond in English. This was a natural environment for the interviewer who is a native Malay speaker and proficient in English as a second language.

This study was also a form of cross-language qualitative research (Lincoln & González y González, 2008) whereby the researcher was supervised by two non-Malay English speaking academics. As the research data was obtained in Malay, translation of the interview transcripts was required in order to enable the researcher to consult the research supervisors for their expert critiques throughout the process of data analysis. The issues of translation during analysis are further discussed in this chapter.

5.2 Study design

This research was conducted within the post-positivist worldview (Creswell, 2009) in order to investigate a problem by incorporating people's complex experiences of a phenomenon (Grant & Giddings, 2002). In the post-positivist worldview, the problem studied reflects the need for identifying and assessing the causes that influence outcomes (Creswell, 2009). It is under the assumption that the perceived outcome is a result of a complex display of causative factors that interact with each other (Giddings & Grant, 2006, 2007). In this study, it was assumed that decisions on hearing aid uptake can be attributed to a combination of factors perceived by the individual to influence the decision.

The specific research strategy used in this study was qualitative description. It is a distinct method of naturalistic inquiry (Sullivan-Bolyai, Bova, & Harper, 2005) that enabled low inference interpretation (Sandelowski, 2000) of the factors that are perceived to influence Malaysian adults' decision on hearing aid uptake, thus allowing the researcher to stay close to the data and the surface of the words and events described by the participants. The data obtained were described using the terminologies set by the ICF. The discussion for using the ICF terminologies can be referred to in sub-heading 1.2.1.

5.3 Participants

This study was conducted in the Klang Valley, Malaysia where participant recruitment occurred at the Hospital Sungai Buloh (HSB), Sungai Buloh and Hospital Tengku Ampuan Rahimah (HTAR), Klang. Ethical approvals were obtained from the relevant ethic committees as described in chapter 3. A purposive sampling method of homogenous sampling was used to select participants who were eligible for an invitation to participate in the study. Homogenous sampling further narrowed the sample to a specific sub-group of the adults for greater depth of information (Liamputtong, 2009) as the research topic had not been investigated previously in the Malaysian context. The specific sub-group of interest included participants who shared the variables found to be not independent of hearing impairment as obtained from the Chi-square analysis conducted in the Part 1 study. As a summary, the selection criteria for the participants in this study were male or female adults of the Malay ethnicity;

1. who had been seen by audiologists for the first time in the public hospitals,
2. for whom amplification had been recommended,

   AND

3. who were between 40 to 69 years old, if they were seen at HSB,

   OR

4. who were between 50 to 69 years old, if they were seen at HTAR.

The total number of potential research participants at HTAR was 21, of which 18 volunteered to participate in the study. Two of the 18 participants withdrew prior to conducting the first interview and another participant was excluded during the first interview

as the individual could not recount any events surrounding the hearing impairment and hearing assessment. Interview data obtained from four participants were lost during the early stages of data collection; therefore, data from 11 participants from HTAR were included in the final analysis. The total number of potential research participants at the HSB was 13, of which 12 were recruited. One participant withdrew before the first interview was conducted, reducing the total number of participants who completed the interviews from HSB to 11. Data from 22 participants, 11 from HTAR and 11 from HSB, were therefore used in this study. The demographic details of the participants interviewed from the HTAR and HSB were recorded which include gender, age, occupation status, monthly household income, and other health information.

5.4 Participant recruitment

All staff audiologists in the HSB and HTAR were briefed about the research aim and participant selection criteria by the researcher prior to participant recruitment. If, after completing a hearing assessment, an audiologist determined that a patient met the selection criteria for the study, the clinician informed the patient about the study and asked him/her whether he/she wanted to be introduced to the researcher for further information about the investigation. Then the audiologist introduced the researcher to the patient in a quiet room within the audiology clinic. The researcher explained the research study to each potential research participant, provided them with a participant information sheet to take home, and asked their permission to contact them by telephone one day later for their decision on participating in the study. Written consent for the interviews and audiometric information was obtained from each participant prior to commencing the study.

5.5 Materials and procedures

An individual in-depth semi structured interview method was selected for data collection (DiCicco-Bloom & Crabtree, 2006).This interview method allowed for dialogue between the participants and interviewer and enabled the interviewer to probe the participants for more information about experiences with their hearing impairment (Knudsen et al., 2012). An interview guide with open-ended and probe questions was used to ensure all aspects of the topic were covered. During the stage 1 interview, information was sought regarding 1) factors relating to their help-seeking, and 2) factors relating to their hearing aid decision.

During the stage 2 interview, participants were asked whether there was any change to their decision regarding hearing aid uptake. Information was sought regarding the reasons for their decision on hearing aid uptake 1) following the hearing aid demonstration, or for those who chose not to attend hearing aid demonstration, 2) following a period of time after the hearing consultation. An essential component of the interview was building rapport (DiCicco-Bloom & Crabtree, 2006) and this was established by broadly asking, “Can you tell me about your hearing impairment and how it has affected your everyday life?”

Information regarding the participants’ hearing levels was obtained from the hospital files with the help from the hospital audiologists. During the first interview participants were asked to provide some demographic data before proceeding with the semi-structured interview. Stage 1 interviews were conducted within one to four weeks of the participants’ initial hearing consultation. The interviews were held either in a quiet room designated by the hospitals’ authorities, or in the privacy of the participants’ homes, whichever suited the participants. The participants were seen for a second time at a location of their choice for the stage 2 interviews. The timing of the second interview varied depending upon the participants’ subsequent decisions regarding hearing aid uptake:

1) Participants who decided to attend a hearing aid demonstration and then accepted hearing aid recommendation (Group 1) were interviewed within one week after their hearing aid demonstration.

2) Participants who decided to attend a hearing aid demonstration but who declined the hearing aid recommendation (Group 2) were interviewed within one week following the hearing aid demonstration.

3) Participants who decided to decline hearing aid recommendation and hearing aid demonstration (Group 3) were interviewed within one to two months following the hearing consultation. This timing was chosen based on the time interval between the hearing consultation and hearing aid demonstration for participants in groups 1 and 2, which was between two and eight weeks. The timing was consistent with the duration it took for the participants in Groups 1 and 2 to be interviewed for the second time. The timeline is shown in Figure 5.1.

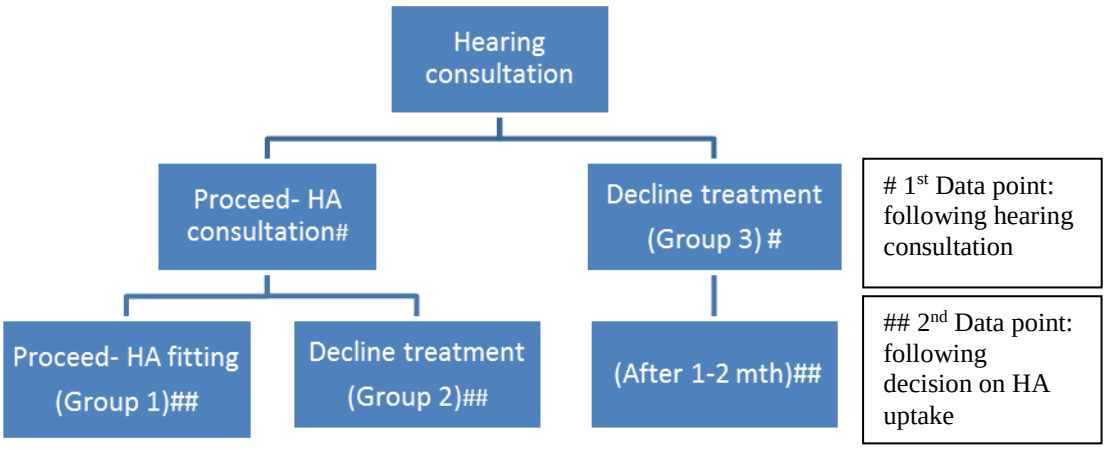

Figure 5.1 A diagram showing the different groups of participants based on their rehabilitation decisions

All interviews were audio-recorded using digital recorder and transcribed verbatim based on the recommendations of Poland (1995).

5.6 Analyses

5.6.1 Descriptive analysis

Descriptive analysis was used to describe the demographic and audiological profiles of the participants in each hospital. Age, income, and pure tone thresholds were described using median and quartiles. Prevalence of decision to take up hearing aid was calculated. Education level, employment status, health concerns, and perception of personal health were presented descriptively.

5.6.2 Translation process

As this was also a cross-cultural study, the issue of translation was given a thorough consideration prior to data analysis. The translation process from the source language to the target language can occur at various stages of a study. Santos, Black, and Sandelowski (2015) summarised five key points in time where translation might occur. These are presented in the table below.

Table 5.1.Timing of translation in cross-language qualitative research (Source: Santos et al. (2015))

Timing of Translation	Objects of translation	Study examples
Prior to data collection	When the objects of translation are instruments of data collection (here primarily interview guides, but also questionnaires and surveys), usually designed to be free of colloquialisms	Larkin, Dierckx de Casterlé, & Schotsmans, 2007
During data collection	When interpreters translate questions in the data collection instrument into the language of participants to obtain information from them (including the	Wallin & Ahlström, 2006

	use of simultaneous interpretation to conduct interviews), and the object of translation is real-time conversation between researcher and participant	
During data preparation	When data collected in a source language is translated to a target language, with verbatim transcriptions of interviews as the object of translation	Lopez, Figueroa, Connor, & Maliski, 2008
During data analysis	When the categories and concepts generated through analysis of the data in the source language are the objects of translation into the target language	Chen & Boore, 2010
At dissemination of findings	When one or more research reports as an end product from study conducted in the source language are the object of translation for publication in journals in the target language	van Nes, Abma, Jonsson, & Deeg, 2010

In a qualitative descriptive study, Lee, Tripp-Reimer, Miller, Sadler, and Lee (2007) studied Korean American women's subjective perceptions of breast cancer and cervical cancer to accurately describe their symbolic meanings of their breast and cervix. Following data collection in the Korean language, a professional translator who was fluent in English and Korean was employed to translate all transcripts into English for analysis. The primary author assessed the translated transcripts and discussions were made with the professional translator on any disagreements of translation until consensus was reached. Similarly, in a qualitative study, Lopez et al. (2008) employed a team of translators to perform verbatim

translation of all data in Spanish into the English language. Any issues with translations were discussed and a collective decision made by the translation team. The completed translations were submitted to the lead translator for a critical review to ensure translation accuracy before submission to the principal investigator.

Using the same study design employed by Lee et al. (2007), Santos, Sandelowski, and Gualda (2014) explored Brazilian women's thoughts of harming their infants and the response to mothering while experiencing postnatal depression. The Portuguese transcripts of the interviews were given to a professional British-English translator to be translated into English. Back translation was carried out on all English-translated data into Portuguese. Comparison was made between the Portuguese-English version and the English-Portuguese version and mistranslations corrected. Data were analysed using thematic analysis; during this process, another professional translator was appointed to further ensure that the meanings conveyed by the interviewees were truly represented.

The above mentioned studies applied the translation process during the data preparation stage (see Table 5.1) where professional translators were employed to conduct translation on verbatim transcriptions. The differences between the studies were with the measure taken to ensure trustworthiness of the translation (Squires, 2008). In the study by Lee et al. (2007) the primary author conducted a critical review (Squires, 2008) of the translated transcripts and wherever disagreements found, the author discussed them with the translator until consensus was reached. Critical review of this was also adopted by the translators appointed by Lopez et al. (2008) as a final measure for translation accuracy. In contrast, Santos et al. (2014) employed a Brazilian teacher of British English, with experience translating articles from English into Portuguese, to carry out back translation. The primary researcher compared the forward and back translation versions to view the mistranslations pointed out by the back-translator. Then the copies of the forward and back-

translation files containing comments from the primary author were sent to both the forward and backward translators. The forward and backward translators were asked to discuss the mistranslations and the most appropriate translations until consensus was met. The use of professional translators may add to the validity of the translation process, and the research as a whole (van Nes et al., 2010), however, it is labour intensive, costly, and time consuming.

A later stage translation was suggested by Chen and Boore (2010) following their review of the literature and Chen's unpublished doctoral thesis in 2004. The authors described that the analysis conducted on Chinese and English versions of interview transcripts obtained during Chen's doctoral study yielded similar concepts and categories when compared. They stated that translation of concepts and categories developed from the transcripts in the source language were adequate and satisfactory. However, they recommend the use of two translators to achieve high quality translated transcripts (Chen & Boore, 2010) and to enable checks on possible errors in translation. By delaying the translation process to the data analysis stage, the authors were able to resolve time and financial constraints. Their subsequent work involving data in Chinese was analysed in the source language with the translation conducted on the emerging concepts and categories.

In an exploratory study to examine the influence of translation on the validity and reliability of qualitative data, Twinn (1997) also found no significant differences in the major categories and themes generated from the use of English or Chinese language to analyse data. They reported some of the differences emerged as a result of translation were partly due to absence of equivalent words to be translated into English. van Nes et al. (2010) also supported remaining in the source language as long as possible in qualitative studies as some of the meanings in the source language may be lost in translation. They argued that thinking and reflecting in a language other than one's own may have some influence on the analysis

process, and therefore recommended delaying the translation process as much as possible to avoid potential limitations in the analysis process.

In summary, there is no consensus regarding the standard procedure for evaluating the influence of translation on data analysis. Regardless of the stage of translation employed, reported studies involving a translation process selected procedures by considering the trustworthiness of the translation. These measures included: 1) employing professional translators (Lee et al., 2007; Lopez et al., 2008; Santos et al., 2014), 2) conducting critical review of the translated materials (Chen & Boore, 2010; Lee et al., 2007; Lopez et al., 2008), and 3) conducting back translation of the translated materials to the source language (Santos et al., 2014). These measures were given much deliberation in order to develop the translation process for this study.

An important consideration was to perform translation at the data preparation stage in order to enable the researcher to be in constant consultation with the supervisors during the data analysis stage. However, the researcher also needed to consider the financial and time constraints of the research. Thus, the following procedure was developed to overcome language barriers during the analysis of the Malay transcript between the primary researcher (native speaker of Malay and proficient in English as a second language) and the research supervisors (non-Malay, English speakers).

First, interviews in Malay were transcribed verbatim in the source language. Then one Malay transcript was translated into the English language verbatim. The primary researcher served as a translator as she is bilingual and possesses the linguistic competence of the Malay and the English language (Squires, 2008). The decision to use a single translator was made in order to ensure consistency of translation across transcripts and maximise the reliability of analysis (Squires, 2009; Twinn, 1997).

Following the recommendation by Squires (2008), the translated transcript in full was given to an independent reviewer. The independent reviewer was a bilingual native Malay speaker, who was undergoing PhD study in the field of Audiology, to check for technical and conceptual accuracy (Squires, 2009) of the translation. Squires (2008) argues that a critical review by a bilingual independent source serves no less than back translation in ensuring accuracy of translation, provided that an independent source is consulted. The independent reviewer also had a 10 year working experience in the field of Audiology prior to commencing his PhD study, and therefore is familiar with the area of this research. The primary researcher and the independent reviewer discussed any mistranslations occurring at the word level or the contextual level until consensus was met.

The final English transcript was used to train the primary investigator, a novice qualitative researcher, in the process of qualitative content analysis. The training exercise involved extracting meaning units, condensing meaning units, and applying codes to the condensed meaning units based on the recommendation by Graneheim and Lundman (2004). The researcher's early analysis was presented to the supervisors for reviews and discussion to ensure credibility of the analysis process. The process of translating the Malay transcripts into the English language verbatim and the ensuing steps was repeated until the research supervisors reached a consensus that the primary researcher was able to conduct early analysis credibly. Three interview transcripts were translated and analysed before this consensus was reached.

Early analyses were conducted in the source language for the remaining 40 transcripts. The early analysis of these 40 transcripts generated condensed meaning units and codes in the source language. These were then translated into English by the researcher. The translated sections of the documents were presented to the independent reviewer for a critical review of the Malay to English translation.

Any disagreements in translated meanings were discussed until an agreement was reached on the accuracy of the translation. Whenever there were disagreements or uncertainties between the researcher and the independent reviewer about the translation of the codes, the researcher translated the meaning units from which the codes were generated into English, and presented them along with the codes to the research supervisors for their expert opinions. Decisions from the supervisors' review were then discussed with the independent reviewer in order to reach a consensus about the most accurate translation of the codes. Figure 5.2 provides a summary of the translation process and early analysis of the interview transcripts.

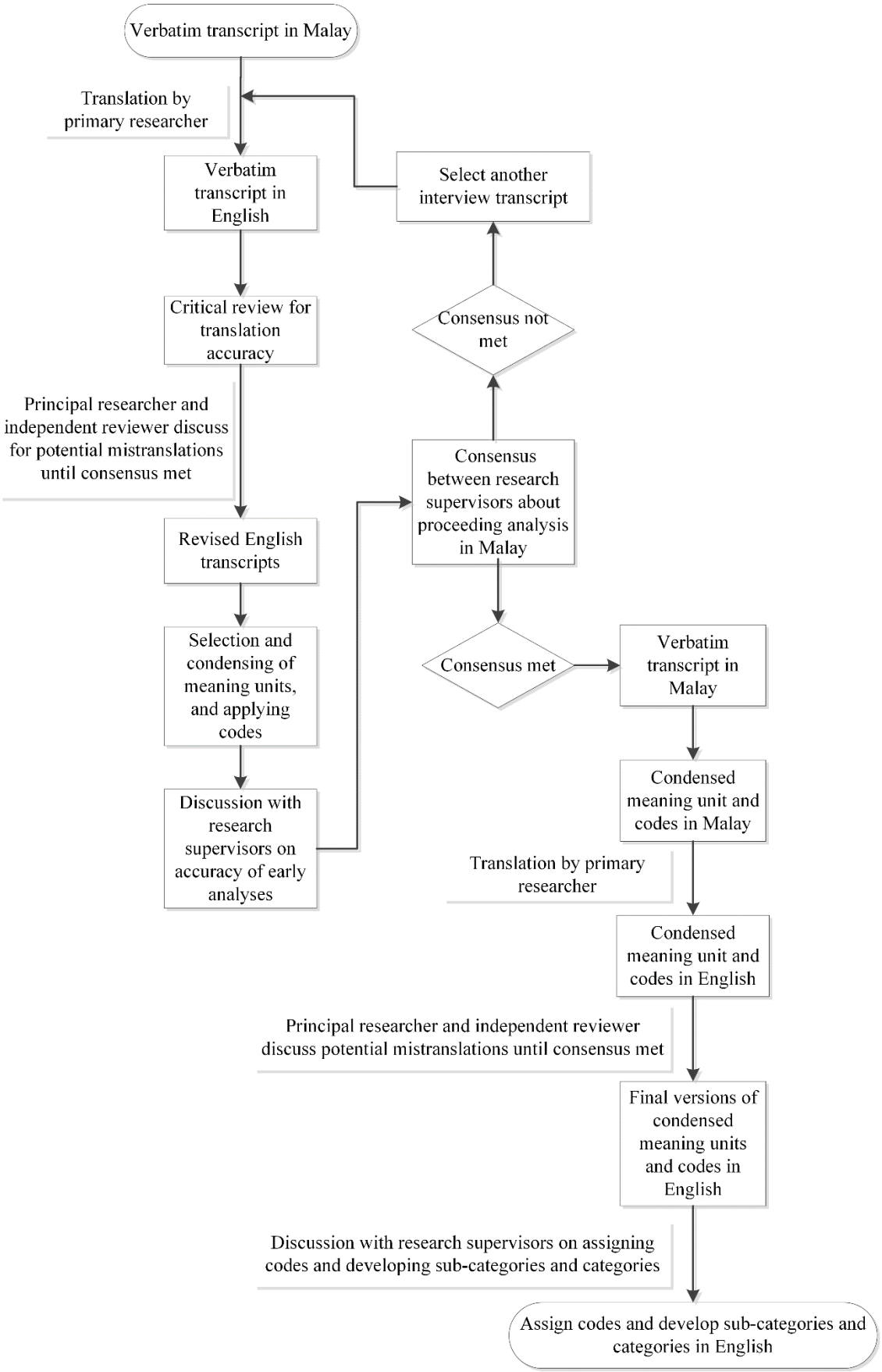

Figure 5.2 Translation process and early analysis of interview transcripts.

5.6.3 Qualitative content analysis

Analysis of the interview transcripts was conducted based on the guidelines for qualitative content analysis set by Graneheim and Lundman (2004). First, the transcripts were read and re-read in order to increase familiarity with the text and to gain an overall sense of the participants' perception of factors that influenced their decision on hearing aid uptake. Second, content areas were identified based on the specific research questions set for each stage of the interview, and colour coded to clearly distinguish each area. Third, meaning units, which describe factors that influenced the participants' decisions on hearing aid uptake were identified. Fourth, condensed meaning units were developed that maintained the core meaning of the factors that were described. Fifth, each condensed meaning unit was labelled with a code. At this stage the research team convened to peruse and discuss the analysis process to ensure the accuracy of the early analysis. Several revisions were made at each stage of the early analysis until consensus was reached.

After labelling the codes, they were reviewed again and revised to establish the final codes. Finally, similar codes were grouped into categories. Through the process of abstraction (Graneheim & Lundman, 2004), a few of the categories were divided into sub-categories, and sub-categories sorted into categories. An example of condensed meaning unit, codes, sub-categories and categories is presented in Table 5.2.

Table 5.2. Example of condensed meaning unit, codes, sub-categories and categories for the environmental factors that serve as facilitators to hearing aid uptake

Condensed meaning unit	Codes	Sub-category	Category
K13: The ENT specialist sent me to the hearing unit	ENT specialist refer to audiologist	Recommendation by ENT specialist/ medical officer in ENT clinic	Recommendation by professionals in the public service
S1: The ENT specialist said I need to come again on the 9th, to do the hearing test	ENT specialist recommend hearing assessment		
S7: If I wear it, I can hear. because that was what the ENT specialist told me	ENT specialist recommend hearing aids		
K8: audiologist said that I need to wear hearing aids	Audiologist recommends hearing aids	Recommendation by audiologist	
S3: The person in the audio room offered (hearing aid demonstration)	Audiologist recommends hearing aid demonstration		
K12: “If you agree, this is how they look like”. The audiologist showed me this picture, with the hearing aids on the ears. That influenced me to want to order, to get that thing.	Audiologist shows hearing aid images		

5.7 Rigour

Research rigour was ensured through the assessment of four aspects of trustworthiness: credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). *Credibility* is another term for the truth value of the research findings (Lincoln & Guba, 1985) in addressing the research questions. The first step taken to ensure credibility was to provide a clear statement of the research questions and then to systematically document methodological and analytical decisions so that the process could be audited (Giddings & Grant, 2009). At the beginning of the interviews the interviewer used prolonged engagement to ensure good rapport building, as good rapport stimulated the participants to volunteer different or perhaps sensitive information, hence enabling recurrent patterns to be identified and verified (Krefting, 1991). During the interview process, questions were re-framed, repeated or expanded (Krefting, 1991) as a means to achieve credibility.

Peer examination was another process paramount to this research in order to achieve credibility. The research supervisors were frequently consulted to provide their expert comments during the planning and conducting of the research. They were debriefed (Krefting, 1991) about the data collection process and any problems that emerged. At the beginning of data analysis, the supervisors critically assessed three complete verbatim translations of transcripts to ensure the researcher's accurate selection of meaning units, their condensations and abstractions (Graneheim & Lundman, 2004). Throughout the data analysis process, the supervisors were constantly consulted for their expert critiques (Giddings & Grant, 2009) and for their consensus on the abstraction process when any uncertainties arose.

Transferability is the criterion against which the applicability of the data (Krefting, 1991) to other settings or groups can be assessed. Dense background information about the participants and the research context and setting were provided in order to allow others to

assess how transferrable the findings are to their own settings (Graneheim & Lundman, 2004). Related to the consistency of findings is the *dependability* criterion. A research design is dependable when the repeated administration of the measure provides the same results from the participants (Krefting, 1991). Peer examination also served to ensure dependability of the study (Merriam, 1995). The research supervisors provided a check that the researcher was interpreting the data credibly to ensure that the emerging results were consistent with the data collected (Merriam, 1995). Additionally a thick description of the research process (Krefting, 1991) was also provided so the results may be repeated in a similar context (Glogowska, 2011).

The final criterion, *confirmability,* is the degree to which the research findings came from the participants, rather than being based on the biases of the researcher (Guba, 1981). Within the post-positivist's worldview, although the focus is on the rigour of study method and its trustworthiness (Giddings & Grant, 2009), it is acknowledged that researcher's perceptions were viewed as not completely detached from the investigation (Clark, 1998) and that maintaining objectivity is impossible (Giddings & Grant, 2007). Being an experienced audiologist who had worked in a hearing aid dispensing company, and provided audiology services in a public health service, the researcher was not freed from her own biases. Guba (1981) recommended the use of reflexivity in addressing this concern. Throughout the research journey the researcher kept a journal on any discussions and decision making process; detailed notes on thoughts, observations, and experiences were made following each interview session (Carlson, 2010). These notes were reviewed and considered during the early stages of data analysis. Additionally, Krefting (1991), in a description of Guba's (1981) model of assessing trustworthiness, summarised that confirmability is achieved when credibility and transferability are established; both of which were given much emphasis in this study.

CHAPTER 6

PART II RESULTS

6.1 Introduction

This chapter provides the results of the Part 2 qualitative study, which was conducted to describe factors influencing hearing aid uptake amongst Malaysian adults, particularly those living in the Klang Valley. The participants' demographic and audiological data are presented in the first section, followed by the qualitative content analysis results.

6.2 Results

6.2.1 Participant demographic and audiological results

Interviews were conducted in two phases with 22 participants recruited from the HTAR and HSB. One participant recruited from the HTAR died before the second interview was due. Therefore, 43 interviews were completed. Fifteen male and seven female participants were recruited with about half (55%) of the participants aged between 60 and 69 years. The participants' education level ranged from primary level to undergraduate degree where the majority of participants reported having lower secondary education (68%). More than half (59%) of the participants were unemployed or retired. A large proportion of the participants (82%) reported having at least one personal health concern. Half of the participants perceived their health as being either good or very good. The lowest monthly household income reported was RM 200 and the highest was RM 6000, with the median of RM 2500. Table 6.1 provides a summary of the participant characteristics while the details of the demographic information are presented in Tables 6.2 and 6.3. Note that the participants'

adherence or non-adherence to recommendations for hearing aids are indicated in their de-identifying codes (see captions for Tables 6.2 and 6.3).

Table 6.1 Summary of participant characteristics from HTAR and HSB

Characteristics	Participants % (n)
Gender	
Male	68% (15)
Female	32% (7)
Age	
40-49	9% (2)
50-59	36% (8)
60-69	55% (12)
Education level	
Lower Secondary *-Primary and Lower Certificate of Education Malaysia*	64% (14)
Upper Secondary *-Vocational certificate and Malaysian Certificate of Education (O-Level equivalent)*	18% (4)
Pre-university *-Malaysian Higher School Certificate (A-Level equivalent)*	4.5% (1)
Professional education *-Teaching College certificate*	4.5% (1)
Higher education *-Diploma and Bachelor degree*	9% (2)
Occupation status	
Employed (full or part-time; public or private)	41% (9)
Unemployed or Retired	59% (13)
Personal health concerns	
None	18% (4)
One health concern	32% (7)
More than one health concern	50% (11)
Perception of personal health	
Very good	4.5% (1)
Good	45.5% (10)
Okay	32% (7)
Poor	18% (4)

Table 6.2. Demographic details of participants recruited from HTAR

ID*	Gender	Age	Education level	Occupation status	Current/ Previous employment	Monthly household income**	Personal health concern	Perception of personal health***
KN5	Male	61	Primary	Retired (non-pensioner)	Private Palm oil factory employee	1500	Diabetes	Poor
KN6	Male	66	Primary	Retired (pensioner)	Public hospital attendant	600	Poor vision, joint aches	Good
KA7	Male	63	Lower certificate of education	Full time self-employed	Private company officer	3000	Heart condition, diabetes	Okay
KA8	Male	59	Primary	Retired (pensioner)	Crane operator with government-linked company	300	Heart condition, hypertension, diabetes, stroke, cataract	Poor
KN9	Female	52	Malaysian Certificate of Education (O-Level equivalent)	Full time employee	Private company supervisor	3000	Hypertension,	Okay
KA10	Male	57	Malaysian Higher School	Full time	Salesperson	2000	Nil	Good

			Certificate (A-Level equivalent)					
KA11	Male	69	Primary	Retired (non-pensioner)	Private security guard	2500	Nil	Good
KN12	Male	65	Lower certificate of education	Retired (pensioner)	Public hospital attendant	1500	Hypertension	Good
KA13	Male	63	Primary	Part-time self-employed	Palm oil farming	1000	Diabetes, hypertension, kidney condition	Poor
KA15	Male	65	Teaching College certificate	Retired (pensioner)	Public school teacher	2600	Diabetes, hypertension, kidney condition	Okay
KA16	Male	51	Lower certificate of education	Full time employee	Private company van driver	2500	Hypertension	Good

*Participants' adherence (-A) and non-adherence (-N) to hearing aid recommendation is indicated
**In Malaysian Ringgit (MYR)
***Rated between: poor, okay, good, very good

Table 6.3. Demographic details of participants recruited from HSB

ID*	Gender	Age	Education level	Occupation status	Current/ Previous employment	Monthly household income**	Personal health concern	Perception of personal health***
SN1	Female	66	Primary	Retired (non-pensioner)	Printing factory employee	1000	Cancer (in-remission)	Good
SA2	Male	63	Primary	Retired (non-pensioner)	Private company van driver	3500	Heart condition, kidney condition, diabetes, hypertension	Okay
SN3	Male	55	Diploma certificate	Full time self-employed	Business owner, casual social worker	1000	Hypertension, hernia	Okay
SN4	Female	59	Primary	Retired (non-pensioner)	Self-employed	2500	Diabetes, hypertension,	Good
SN5	Male	43	Vocational certificate	Full time employee	Automotive industry quality control officer	2900	Nil	Good
SA6	Female	66	Primary	Retired	Embroiderer	200	Nil	Very good
SA7	Female	60	Lower certificate of education	Un-employed	Casual tailoring	300	Diabetes, hypertension	Okay
SA8	Male	55	Malaysian Certificate of	Employed (On medical leave	Automotive engineering	3000	Epilepsy	Poor

			Education (O-Level equivalent)		industry executive			
SA9	Male	58	Undergrad-uate degree	Retired (non-pensioner)	Private company general manager	6000	Diabetes, hypertension, sinusitis	Good
SA10	Female	60	Malaysian Certificate of Education (O-Level equivalent)	Un-employed	Child caretaker and casual tailoring	3000	Hypertension	Okay
SA11	Female	48	Lower certificate of education	Full time employee	Laundry service	4000	Hypertension, asthma, sinusitis	Good

*Participants' adherence (-A) and non-adherence (-N) to hearing aid recommendation is indicated
**In Malaysian Ringgit (MYR)
***Rated between: poor, okay, good, very good

The participants' hearing thresholds were averaged at 4 frequency levels: 0.5, 1, 2 and 4 kHz, and categorised into five levels of hearing impairment according to the MOH's classification of hearing impairment (Perkhidmatan Audiologi KKM, 2014b). Almost half (n=9) of the participants had moderate hearing impairment in at least the better ear, and the majority of the participants had mild to moderate hearing impairment. These data are shown in Figure 6.1.

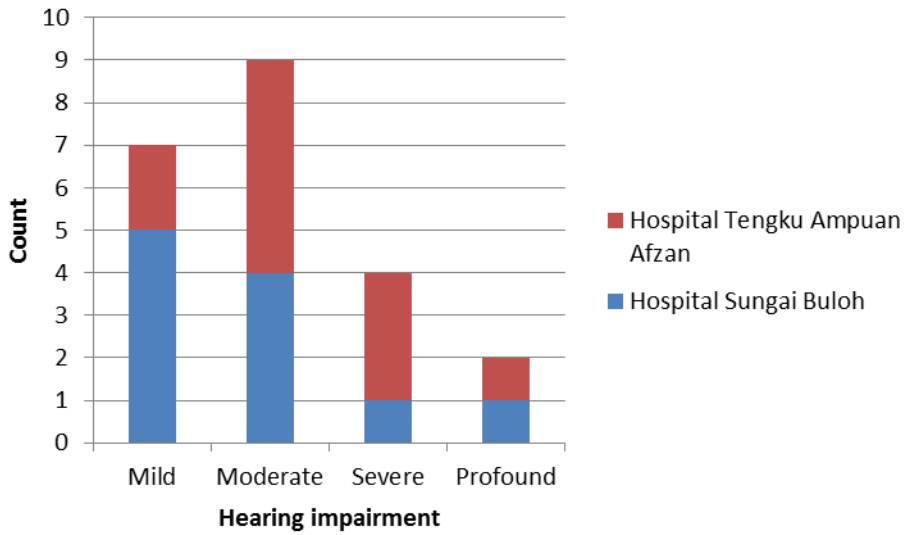

Figure 6.1 The distribution of better ear hearing thresholds (n=22) based on the MOH adopted classification

6.2.2 Qualitative content analysis results

The research questions were always at the forefront of data analysis, and the condensation and abstraction process was performed within the "factor groupings" derived from the research questions. The factor groupings were:

1) Personal factors that were perceived to support hearing aid uptake,

2) Environmental factors that were perceived to support hearing aid uptake,

3) Personal factors that were perceived to hinder hearing aid uptake, and

4) Environmental factors that were perceived to hinder hearing aid uptake.

During the abstraction process of the analysis, a number of the codes did not appear to fit into the context of the above listed factor groupings. Therefore, new factor groupings were developed as follows:

5) Activity limitations and participation restrictions that were perceived to support hearing aid uptake,

6) Impression of activity limitations and participation restrictions during hearing aid demonstration that were perceived to hinder hearing aid uptake,

7) Impression of improved activities and participation during hearing aid demonstration that were perceived to support hearing aid uptake, and

Impression of improved activities and participation that were perceived to hinder hearing aid uptake.

Table 6.4 and

Table 6.5 lists the factors perceived to support and hinder hearing aid uptake. The factor groupings in red indicate that they emerged during the second set of interviews. Similarly, the categories in red indicate that either the category and/or its sub-category(s) emerged during the second interview. Each of the categories may or may not include sub-categories, lower-level categories, and codes. As category is defined as "units of content that share a commonality" (Krippendorff, 2004, p. 105), the codes that do not share any commonality are treated as a category. In the following subsections, categories are illustrated with selected interview excerpts. The excerpts are preceded with participant de-identifying codes. Sections in parentheses refer to contextual information added from notes taken by the researcher during and after the interview.

Table 6.4 Factors that were perceived to support hearing aid uptake

Factor groupings	Categories
Personal factors	1. Self-initiated (17) 2. Finding a solution to hearing problem (16) 3. Feelings about hearing impairment (15) 4. Other health-related conditions (13) 5. Internal influence on decision making (10) 6. Desire to hear (10) 7. Character/Behaviour pattern (10) 8. Feelings following hearing aid demonstration (7) 9. Self-perceived hearing impairment (7) 10. Condition worsening (4) 11. To know underlying problem (4) 12. Preventive solution (3) 13. Age factor (2) 14. Religious factor (2) 15. Stage of life (1) 16. Becoming baffled (1) 17. Gets health back (1) 18. Interim solution (1)
Environmental factors	1. Recommendation by health professionals in public service (20) 2. Recommendation by immediate family (15) 3. Relating to hearing aids (15) 4. Attitudes of others towards participant (13) 5. Access to outside funding (12) 6. Recommendation by health professionals in private service (6) 7. Provision for hearing aid demonstration (6) 8. Employment interest (5) 9. Confidence with service provider (3) 10. Hearing test experience (2) 11. Indirect influence of others (2) 12. Safety issue (2) 13. Cost (2)

	14. Hearing aid demonstration led to positive perceptions about the aids (3) 15. Audiologist provide a choice of hearing aids during aid demonstration (1) 16. Audiologist assisted in making hearing aid purchase at discounted price (1) 17. Satisfied with the audiology service (1) 18. Kinship relation with ENT specialist (1) 19. Workplace hearing assessment (1)
Activity limitations and participation restrictions	1. Communication (14) 2. Group discussion (5) 3. Activities in the community (5) 4. Talks (4) 5. Television (4) 6. Telephone use (4) 7. Difficulties in background noise (3) 8. Shopping (2) 9. General (2) 10. Travel (1)
Impression of improved activities and participation during hearing aid demonstration	1. Improved communication during hearing aid demonstration (8) 2. Improved telephone use during hearing aid demonstration (1)

Note. Numbers in parentheses represent the number of participants who contributed to the category. Categories in red indicate that either the category or its subcategory/s were contributed from interview 2 which were conducted within 1 to 2 months from interview 1. ENT = ear, nose, and throat.

Table 6.5 Factors that were perceived to hinder hearing aid uptake

Factor groupings	Categories
Personal factors	1. Unable to afford hearing aid cost (12) 2. No interest (11) 3. Internal influence on decision making (9) 4. Perceives no problem with hearing (8) 5. Character/Behaviour pattern (6) 6. Feelings about hearing impairment and hearing aid use (5) 7. Perceptions of hearing aids (4) 8. Outcome of medical intervention (2) 9. Concern hearing aid worsens hearing (2) 10. Religious factor (2) 11. Age factor (2) 12. Feelings following hearing aid demonstration (2) 13. No opportunity (1) 14. Unable to afford hearing aid maintenance costs (1) 15. Unsure about hearing aid suitability (1) 16. Perceive a long adjustment time to wearing hearing aids following hearing aid demonstration (1) 17. Perceive hearing impairment can be treated using traditional medicine (1)
Environmental factors	1. Issues with hearing aids (18) 2. Attitudes of others towards participant (12) 3. Absence of recommendation from health practitioner in public service (9) 4. Incomplete information (7) 5. Reliance on ENT specialist's decision (5) 6. Ambiguous information from health practitioner (3) 7. Reliance on immediate family (2) 8. Absence of recommendation from health practitioner in the private service (1) 9. Long wait time in public service (1) 10. Unaware of hearing test existence (1) 11. Audiologist gave an option to monitor hearing levels while deciding on hearing aids (1)

	12. Observation of other hearing aid users (1) 13. Unaware of sources for financial assistance (1) 14. No knowledge about hearing aids (1)
Impression of activity limitations and participation restrictions during hearing aid demonstration	1. Communication issues during hearing aid demonstration (1) 2. Obstruction to religious ritual (1)
Impression of improved activities and participation	1. Improved communication (4) 2. Improved participation in talks (1) 3. Improved activities in background noise (1)

Note. Numbers in parentheses represent the number of participants who contributed to the category. Categories in red indicate that either the category or its subcategory/s were contributed from interview 2 which were conducted within 1 to 2 months from interview 1. ENT = ear, nose, and throat.

6.2.2.1 Personal factors that were perceived to support hearing aid uptake

Personal factors that were perceived to support hearing aid uptake were comprised of the individual personal background features of the participants' lives that were not part of their hearing impairment. Participants described how they noticed their hearing impairment or difficulty hearing in certain situations *(Self-perceived hearing impairment)* which led them to initiate a visit to a clinic to seek consultation *(Self-initiated).* One participant also described how he began to notice his hearing deterioration after being in a new employment setting and took action by reporting it to his employer:

> *KN5: "… about two years or three years, already started to hear poorly, I complained to my employer"*

Participants revealed how they thought and asked themselves *(Internal influence on decision making)* about whether or not to reveal their hearing difficulties and to seek a consultation. They disclosed having a sense of discomfort asking people to repeat themselves

in conversational situations where they had difficulties understanding or being not able to respond accordingly when comments were made:

KA10: "For example, when I speak to two (or) three friends, they suddenly laugh, I keep quiet as if I don't really understand what they are (saying). So I feel inappropriate like that (when participant doesn't laugh together with friends)"

They also considered how important their hearing was and weighed the benefits of getting a solution to their hearing problem:

SA11: "When I think about it, if I can't hear, who will help me, right? I have to help myself"

Some participants' Character/Behaviour pattern appeared to influence their decisions to take on hearing aids. They expressed dislike seeing others having to speak repeatedly in order to accommodate to their poor hearing. One participant expressed dissatisfaction when unable to understand whenever involved in conversations:

KA15: "One big problem that I have there is no satisfaction. When people chat I don't know (don't understand), I often can't hear so that is a problem"

There was also a number of participants who followed through with recommendation for a hearing assessment after a consultation for ear-related or health-related conditions *(Other health related conditions)*. For example, a participant who was aware of his hearing impairment disclosed that he agreed to a hearing assessment after being prompted by a medical doctor at a district health clinic:

KN5: "that (regular visit to Port Klang clinic for diabetes check) was how I got transferred (referred) to Klang (hospital) to go check my hearing"

Apart from expressing the desire to hear like they previously did (*Desire to hear*), participants also wanted to discover the cause of their hearing problems *(To know underlying problem)*:

KN9: "I also want to know why I can't hear. That's the reason (for seeking hearing consultation) actually"

A number of participants expressed their perception of hearing deterioration or concerns of potential hearing deterioration should treatment be delayed *(Condition worsening)*:

KA10: "If I wait any longer, maybe it (hearing problem) become worse, right?"

Participants who mentioned their intention to overcome the hearing problems *(Finding a solution to hearing problem)* may not necessarily seek hearing consultation with the intention to get hearing aids as the solution to their problems. A number of participants hoped to receive any form of medical intervention as an initial step and if unsuccessful, planned to resort to hearing aids as the last solution:

KA7: "*I asked (the medical officer at the ENT clinic) if this ear can't (be treated) anymore. If so I'll understand, that it does not matter where I go anymore, if it (hearing) can't get better, I have to get hearing aids, I'll buy it"*

A group of participants viewed the hearing aids as a means of preserving their hearing condition *(Preventive action):*

SN3: "I don't want (if in case) I don't take any early action, I'm afraid it might be too late. Suddenly I can't hear anything at all"

One participant associated hearing impairment with poor health and perceived seeking intervention as a means for recovering his good health *(Gets health back).* The participant also viewed amplification as a temporary measure *(Interim solution)* to a finding a more permanent solution:

> *KA7: "But I will keep trying look for an ENT specialist who could treat my ear (hearing problem) because for the time being I consider only wearing it (hearing aids) temporarily"*

Age *(Age factor)* was reported as a contributing factor to participants' decision-making on hearing aid uptake. One participant expressed his readiness to seek help only at an older age:

> *KA7: "I didn't want to (get hearing checked), too scared. Now I feel brave (to get a hearing assessment), old already"*

In addition, this participant reported that he had more spare time after retirement *(Stage of life)* to focus on health related conditions including his hearing impairment. However, another participant perceived that he would be employed for a number of years in the future and therefore required hearing aids in order to function at work:

> *KA16: "Because I am still young, not at retirement age yet I really need it (hearing aids to be able to continue working)"*

Participants expressed various feelings and emotions brought about by their hearing impairment *(Feelings about hearing impairment).* Many felt embarrassed about their communication difficulties and helpless by their inability to do anything about it. They felt stressed and worried whenever they did not understand what was being communicated by

their communication partners and friends. People reported feeling inferior due to the hearing problems, losing confidence, and feeling isolated from their social circle:

KA13: "I'm the one who cannot interact with them (the community). When I think that way I think I feel distanced from the community, so I thought how it would be like if I can hear like before"

The same participant also revealed that he was *Becoming baffled* as he could not engage in daily activities such as having social interactions and watching television.

Others conveyed feeling dissatisfied and fed up when they could not understand conversations:

KA15: "There are times when he (spouse) speaks I don't know whatever things he says I get fed up"

Some participants also expressed a feeling of sadness and regret over their inability to fully understand conversations:

SA9: "So when he (a friend) related a story I was just guessing what he was saying, so I felt regret and felt sad too because I could not get what he said a hundred percent"

The participants also expressed feelings about the hearing aid demonstrations that were provided during their follow-up appointments that influenced their decisions. Some participants felt comfortable listening through the hearing aid and felt content and happy to discover that they were able to hear using the aids. A participant expressed relief to discover that hearing aids could enable her to hear clearly:

SA7: "Conversations seemed clear. Now that I've worn the device (wore hearing aids during the hearing aid demonstration), I feel relieved"

Religious faith also played a role in the participants' decision for hearing aid uptake. Participants stated that they accepted the hearing impairment as fate from God and that it was their responsibility to find a solution to the problem:

> *SA10: "(I) want to try it (hearing aid) in case there's a way out of the (hearing) problem…like (for example) hearing and vision, all belongs to God. If He (God) wants to take them (the senses) away, we can't regret it, already fated. We treat it as fate. So we don't have to feel inferior (to wear the hearing aid)"*

6.2.2.2 Environmental factors that were perceived to support hearing aid uptake

These factors referred to the external aspects of the participants' lives that supported their decision for hearing aid uptake. The environmental factors were either in the participants' immediate environment or within the social structures, services, and overall approaches or systems in the community or society (World Health Organisation, 2001).

Recommendations by health professionals was identified by the participants as an important aspect influencing the process for hearing aid uptake. Almost all of the participants revealed receiving some form of *Recommendations by health professionals in the public services*. The health professionals included the ENT specialist/medical officer in the ENT clinic, general practitioner (GP), audiologists, medical specialists in areas other than ENT, and other health personnel serving in the public hospitals or clinics. Referral to the hospital by the GP in public health clinics was often described by the participants to be the initial step towards obtaining a hearing assessment. A few participants requested a referral to the ENT specialist from their GP:

> *KA15: "I went for my routine check-up. That day I saw one doctor, he was really friendly, like a friend. So I said I want to (make a) complain. My ears, I have*

complained to many doctors, "I'm becoming deaf, can't hear, you know", I said. "You refer me to the ENT (ENT specialist)", I asked him. "Ok, ok", he (GP) said"

However, others revealed that their visits to the GP were not necessarily due to their hearing problems but other ear or health related conditions which led to the referral to the ENT clinic at the hospital:

'SN1: …the humming (tinnitus) was so loud. I don't know why. That time (the first time) I went to the health clinic, he (GP) gave medication, healed (tinnitus not heard anymore) …This time did not heal. That's how I went to the (ENT) specialist. The doctor told to go to the specialist. That's why I went'

There were also reports of obtaining referrals from specialists (other than the ENT specialist) whom the participants visited for other co-morbid conditions such as cataract and diabetes. Participants either had taken the opportunity of being in the presence of a specialist to inquire about their ear or hearing problems, or were probed by the specialist about hearing problems, which led to a referral:

KN5: "…so during my diabetes check, he (doctor at a specialist clinic) was saying, the doctor talked, I asked (the doctor to repeat himself) ...I couldn't really understand the doctor talking. The doctor asked "you can't hear what I am saying, can you?" I said "I can't hear doctor, hearing loss". "Oh… so you have an ear problem?" the doctor said. "Have you had your hearing checked before?" I said "yes, the first time somewhere close by" …The doctor said "ok, I will write you another letter, go and have it checked again""

Participants also reported obtaining advice about referrals to the hospital from public health clinic medical assistants:

KA8*: "…I asked at the (hospital) registration place. I asked, want to do (get treatment for) the eyes, want to do (get treatment for) the ears. He (the registration staff) said "you have to register first (register at a public health clinic)" Take the (referral) letter at Pandamaran (health clinic) first"*

The ENT specialists/medical officers in ENT clinic were also reported to refer participants to the audiologist and make recommendation for hearing assessments even if the participants' main concern was not hearing impairment:

SN4: "I asked, "doctor (eye specialist), where do I register, my ear is always ringing". So I got to see (the ENT specialist) straight way, he (ENT specialist) check and said that on the outside everything looked good so do a hearing test (ENT specialist sent participant for a hearing assessment)"

Participants indicated that they were asked about their interests in wearing aids and were advised to attend a hearing demonstration before making any decisions:

KA13: "…the doctor (ENT specialist) who treated me, he said send me for a hearing check. Afterwards he said, if there's a trial (Hearing aid demonstration) must wear (the hearing aid) first. After that I want to carry on wearing (the hearing aid) I can. No (Hearing aid demonstration), don't buy (the hearing aid) straight away, he (ENT specialist) said"

Some participants stated that they were advised by the ENT specialist/ medical officer in the ENT clinic that hearing aids can be worn following their medical treatment while others reported being told that there was no other choice but to wear hearing aids as a solution to their hearing problems. Additionally, two participants were informed that wearing hearing aids would prevent their hearing from worsening:

"SA9: Ok, the doctor told me, I should have the hearing aids. Otherwise, the hearing may deteriorate further"

The audiologists in the public service were described to be influential in the participants' decision on hearing aid uptake. Some of the recommendations given by the audiologist echoed the recommendations provided by the ENT specialist. However, the audiologists also provided explanations about the importance of early intervention with hearing aids, gave a basic introduction to hearing aids following their recommendation, and assured participants that time would be given for further explanations and discussion regarding hearing aid use in a follow-up session:

SN4: "I can think about it first. She (audiologist) said "If you feel like wearing it (hearing aid) we can discuss again""

Some participants who attended a hearing aid demonstration felt that the additional information about hearing aids and its function, and explanation about the advantages of wearing hearing aids was helpful. One participant shared that the audiologist assured her that she would be able to expect more natural sound with acoustic modification of the earmould which would be carried out according to the individual's hearing needs:

SA10: "…the second device (hearing aid) I tried I felt comfortable, the voice even though not completely original I could accept it because it felt comfortable at the ear (participant felt comfortable hearing with the hearing aid), not too echoic. She (audiologist) said actually this thing (earmould) needs to be modified, drill a hole (earmould venting) so our voice could escape… (listening through the hearing aid) more comfortable, a little more natural"

Referrals or *recommendations from health professionals in the private service* were also reported as the entry point into getting hearing assessment at the ENT clinic in the public hospitals. Participants were recommended by either their ENT specialist or GP in the private clinics to go to the public hospitals for hearing aid consultations. One participant had even sought initial consultation at a private hearing aid centre, while another participant received advice from a Chinese traditional medicine practitioner, to get hearing help from the public hospital:

> *SA2: "there is a Chinese medicine shop that I go, I check my ears or anything else, he (Chinese medicine practitioner) said, have to go to the hospital. Have to check, to wait (prolonging time before going to the hospital) anything might get damaged (anything in the ear might get damaged) ..."*

In Malaysia, funding assistance for hearing aids is only provided when recommendations for hearing aids come from the public hospital. Being the gateway to *Access to outside funding* was expressed by half of the participants to be an important factor influencing their decisions on hearing aid uptake:

> *KA16: "If applying for the Tithe Fund, follow the procedure. Need to get a confirmation from the specialist, government specialist (specialist from the public service). So that was the reason I went to the hospital, to get further treatment"*

Furthermore, participants revealed that the audiologists provided information about the various agencies from which funding application could be applied and that they would assist in the process for application:

> *KA11: "She (audiologist) said "I'll try" with the JPA (department of civil service), ask for (financial) assistance. The pension office at the JPA"*

Recommendation by immediate family members was described by nearly two thirds of the participants to influence their decisions on hearing aid uptake. Many told stories about how their children encouraged or persuaded them to get their hearing assessment and intervention. Even more participants divulged that their spouse played an important role in their pursuit for hearing aids including suggesting that the aids would be a solution to reduce communication problems:

> *KA10: "If (according to) my wife, better to have the hearing device so (participant) don't have any of these (communication) problems"*

Having a family relation with an ENT specialist (*Kinship relation with an ENT specialist*) proved to be a positive influence to one participant to pursue hearing aids fitting. The participant shared that she was able to skip the process of getting a referral to a specialist clinic and did not have to wait long hours before getting her ears checked:

> *SA7: "…spoke to him (the son-in-law who is also an ENT specialist about the hearing impairment). He said "it's okay mother, I can check your ears. But if you want to come, in the afternoon. At two o-clock in the afternoon". That's what I went in the afternoon. He (the son-in-law) said he is not busy (in the afternoons) …that makes it easy"*

A few participants reported *Indirect influence of others* to play a role in their decisions to adopt hearing aids. One participant felt that listening to other people's opinions about hearing aid use had motivated him to wear hearing aids. Others reported their observation of other hearing aid users had influenced them to pursue hearing aids:

> *SA8: "Looking at the way he could hear (late father-in-law hearing with hearing aids), maybe I could hear too"*

Miscommunication was frequently conveyed as one of the problems with hearing impairment. The significance of communication needs was expressed not only in their personal life but also at their workplace, where participants felt their employment status was at stake. One participant shared that he made the decision to resign from his delivery job as the result of communication misunderstandings which led to frequent delivery mistakes:

> *SA2: "… "Wrong again (wrong delivery). This is going to be difficult. If once or twice that's okay, it is always like that (making wrong delivery)" he (employer) said. He can't bear it anymore, he (employer) said. I felt embarrassed too to keep working with him, I said, let me quit then"*

One participant mentioned that a hearing assessment arranged by his employer at the workplace *(Workplace hearing assessment)* prompted him to consider obtaining hearing aids.

Participants discussed at length how other people's behaviour towards them *(Attitudes of others towards participant)* influenced their decision to consider hearing aid use including positive attitudes such as the audiologist's hospitable service and constant encouragement from friends and employers:

> *KA11: "But when I worked before my employer did encouraged me to wear. (hearing aid). That's how I got it (participant's first hearing aid which is not functioning anymore)"*

However, participants also shared negative attitudes that made them want to acquire aids as a solution to their hearing problems. Family members were reported to become irritated when participants did not respond to them and would also become angry when participants repeatedly asked for clarifications:

KA15: "There are times when he (husband) speaks, I don't get the thing he says. I feel fed-up. If I ask him to repeat, he would scold (me)…"

Some participants revealed that friends avoided them or that they now had fewer friends because they could not have normal conversations with them:

KA11: "Friends who want to cooperate, (would be willing to) write down anything. If (friends) asks anything, not possible (for participant to understand). If they don't want (to write in order to communicate), he'd just keep quiet (referring to friends who would just keep quiet) ... So fewer friends now"

Societal attitudes towards participants were also perceived to affect some participants. Participants expressed concerns about being called deaf and therefore would avoid being involved in conversations or discussions:

SN3: "'Are you deaf, can't hear what people say? We say something you say something else'" (participant narrating what he perceived other people would say). So I don't want that to happen. I want to take care of my image (in a good state of health), right (colloquial filler), so I just keep quiet"

Some people talked about their experiences at the audiology clinic in terms of the hearing test experience, hearing aid demonstration, and the overall service by the audiologist. Participants revealed that going through the various audiological tests *(Hearing test experience)* made them interested in knowing more about hearing aids. Others felt the experience increased their confidence *(Confidence with the service provider)* in the services provided by the audiology clinic. Some participants reported that the *Provision for a hearing aid demonstration* influenced their decisions to acquire hearing aids:

SA8: "(participant wants to try hearing aids) because it can make me hear. Then my hearing will be balanced (balanced hearing between both ears) …If she (audiologist) allows me to try the device, that's good. I want to try it"

The quality of the audiology service and its impression on the individual (*Satisfied with the audiology service)* was highlighted by the following participant:

KA7: "I am satisfied with the treatment given to me (by the audiologist). She (audiologist) gave me the device and she did not say to take this (a particular hearing aid), (audiologist) asked me to choose which one (of the selection of hearing aids) following the test (hearing aid demonstration). I feel that was a very sincere treatment from her"

Those who attended a hearing aid demonstration session commented on the potential benefits they could expect from hearing aids *(Hearing aid demonstration led to positive perceptions about the aids)*. Other aspects *Relating to the hearing aids* were also important factors to the participants. The range of hearing aid styles and technology was appealing to participants and they reported experiencing better hearing when using a hearing aid during the demonstration session:

SA11: "The other day (hearing aid demonstration session) when tried it (hearing aid), I chat with the person (audiologist). Her voice, I heard it clearly"

Participants also discussed the issue of *Cost* as supporting their decision for hearing aid uptake with one participant reporting that the cost of a hearing aid was cheaper than she had imagined it would be:

KN9: "Because I have never seen the aids, the cost and whatever, so I asked how much it does cost. She (audiologist) said more or less a thousand (Malaysian ringgit), a thousand plus. I imagined that perhaps the price was within five to six thousand"

Another participant wanted to attend the hearing aid demonstration at the hospital as he felt that additional costs would be avoided compared attending to the same session at a private hearing aid centre.

Two participants revealed concerns regarding their safety *(Safety issue)* as they felt their poor hearing prevented them from hearing signs of danger:

KA7: "…when sleeping at night, if I lie down on my left side it's uncomfortable. I can't hear very well…I need to hear in case someone breaks in the house at night or anything, (by wearing a hearing aid) I can hear"

6.2.2.3 Activity limitations and participation restrictions that were perceived to support hearing aid uptake

Participants shared stories about activity limitations and participation restrictions that they experienced due to their hearing impairment and reported that these contributed to their consideration for acquiring hearing aids. *Communication* issues encompassing problems receiving and sending spoken messages were frequently revealed as a contributing factor. Many disclosed not being able to understand speech in one-to-one conversations even when at a close distance. Problems were more notable when in a large group or noisy environment:

KN9: "I go to lectures. Sometimes there are friends who would sit next to me at the mosque (religious lectures at the mosque). Sometimes they sit behind me, sometimes on my left (poorer ear). We'd sit cross-legged on the floor (and) suddenly she speaks, that's the time when I don't hear"

Carrying out official matters at office service counters were also reported to be problematic:

KA10: "Especially when we go to any offices, if we have any (official) matters later, what people say I ask (for clarification) repeatedly because their speech is not clear"

Participants reported having to refer to someone for clarification in order to understand the context of a conversation and sometimes avoided being involved in conversations altogether:

'KA15: For example, at the dialysis center, I don't talk (have conversations with the others) because they speak, I hear differently. Whatever they say I don't understand. Sometimes those friends would chat, I can't join'

Some participants indicated that they were unable to share their thoughts due to an inability to engage in conversations and often nodded in pretence even though they could not follow the conversation. One participant reported that communication limitations prevented him from being actively involved in his family life and limited the creation of new memories in his life:

K11: "I just sit there, and look around. If someone comes (to the house), "Uncle, where is your nephew?" (participant narrating someone asking a question) I just stare. "Are you alright?" I say (reciprocating) "alright". That's all, end of discussion… So nothing happens, can't have anything (any forms of interaction). I can't store new memories in my life"

These communication issues also limited participants' involvement in other activities such as attending general or religious *Talks* at the local mosques, being involved in *Group*

discussions, and participating in the *Activities within their community.* Previous routines such as shopping and common tasks such as answering telephone calls became cumbersome:

> *SN5: "… but I feel, really, really uncomfortable now when speaking to people on the phone. I feel, can't hear very well"*

Participants shared that watching *Television* was less enjoyable. They reported that they were often reminded by family members to turn the television volume down and were frequently limited to programs in foreign languages which had Malay subtitles. As a result, some participants were unable to enjoy watching television with the family:

> *KA11: "So there is this imbalance in the house, the family wants to watch Malay programmes, I want to watch Chinese ones (as they have subtitles). Watch Malay ones, I will not know anything so I just go to sleep"*

6.2.2.4 Impression of improved activities and participation during hearing aid demonstration that were perceived to support hearing aid uptake

This factor grouping refers to the positive impressions that the participants had during or after completing the hearing aid demonstration sessions which were perceived to support hearing aid uptake. Some participants felt that the sessions demonstrated improvements in their ability to hear speech (*Improved conversation during hearing aid demonstration*) and telephone calls (*Improved telephone use during hearing aid demonstration*). These participants reported that they were encouraged to walk within the clinic area and that this allowed them to assess their ability to listen to people talking while wearing the hearing aid:

> *SA9: "After putting on the hearing aid I just walk around here (the ENT clinic sitting area) so I feel more comfortable…what the other patient talking I can hear"*

Others felt that when wearing the hearing aids, they did not have any communication problems (*Improved communication during hearing aid demonstration*) with the audiologist and were able to understand the audiologist talking from a distance. This participant reported that he felt that wearing hearing aids would enable him to have conversations with anyone:

> *SA8: "I'm happy with the device, I'm relieved… I should be able to chat with the children and anyone else"*

6.2.2.5 Personal factors that were perceived to hinder hearing aid uptake

This factor grouping refers to how the specific background of the participants' lives were perceived to be a hindrance to hearing aid uptake. The most frequently mentioned factor was *Unable to afford hearing aid cost* as participants revealed that they cannot afford or did not have the money to buy hearing aids. They also said that they do not have the budget allocated to purchase hearing aids. This participant expressed his desire to own hearing aids but indicated that he could not afford to pay for them:

> *KA8: "When it (hearing aid) was put on just now, when wearing it I felt like I really wanted to wear it (to own the hearing aid) because the hearing was clear, but the problem is the affordability. I don't know…"*

The above participant also reported a closely related factor which was *Unable to afford hearing aid maintenance costs*:

> *KA8: "… (The hearing aid) Uses two batteries in a week. She (audiologist) said I have to buy (hearing aid batteries) myself or get an (financial) assistance because it uses a lot of batteries. Every week need to buy (batteries), definitely collapse (an expression of inability to cope with expenses)"*

Almost half of the participants indicated that they had *No interest* in either getting the hearing assessment or hearing aids. Some participants said they did not want hearing aids and would prefer other treatment options:

> *SN3: "... I don't really like wearing assistive devices. I would look for ways for me to use natural remedies. That's my principle, if there are options (other than hearing aids) I would choose so I don't use assistive devices"*

Another participant weighed the benefits of wearing hearing aids over their disadvantages and took that into consideration when deciding whether to obtain hearing aids:

> *SN4: "At the moment I'm not sure (about wearing hearing aids). Helpful or more troublesome? If more troublesome than the sound (coping with tinnitus), I'll let myself be without any devices"*

People's *Character or behaviour pattern* was a factor that also hindered their decision to obtain hearing aids. Some participants viewed wearing hearing aids and the processes required following the decision to wear aids as being difficult. One participant revealed that one of his children offered to contribute to the cost of hearing aids but that he would not accept the offer:

> *SA2: "I'm reluctant to bother my son, ask for money, reluctant because, three, if three of them are working that's fine, they can pitch in (to the fund for hearing aid). If only one is working… the other two are studying, I'm reluctant to bother (his son)"*

Some participants also mentioned reflecting on their coping ability with the hearing impairment and any advice given by various professionals in the health service before making decisions *(Internal influence on decision making)* on hearing aids. They reported wanting to make their own decisions rather than adhering to advice given by family members or health

professionals. One participant indicated that his thoughts regarding delaying obtaining hearing aids were affirmed by the ENT specialist's similar advice:

> *KN6: "I thought if I don't recover like right now, if I have to wear (hearing aids) I will wear. But it's (hearing) okay so no need (to wear hearing aids). On top of that the doctor (ENT specialist) said, "No need to wear, lah (colloquial filler)" …well, it suits my thinking. I don't want to wear (hearing aids), not that I can't hear completely"*

Some participants *Perceived no problems with their hearing* and others stated that the medical intervention they had received for their ear-related illness had eliminated the need to wear hearing aids *(Outcome of medical intervention).* One participant reported a preference to opt for traditional remedies to overcome the hearing impairment *(Perceive hearing impairment can be treated using traditional medicine)*:

> *SN3: "I feel can treat (hearing impairment) with natural methods, herbs. I was told that my left ear problem was a nerve problem…but if the nerves (problem is related to the nerves), there are herbs that can repair the nerves"*

A number of participants reported that they had no knowledge of the hearing assessment *(Unaware of hearing test existence)* and rehabilitation *(No knowledge about hearing aids).* However, others expressed their concerns that the hearing aid could make their hearing impairment worse *(Concern hearing aid worsens hearing)*:

> *SN3: "Often we hear not to use earphones, (the ears) might get damaged. So this is my worry, if I wear (hearing aids) how will it (participant's hearing) be long term?"*

Several participants divulged feelings about their hearing impairment and the idea of wearing hearing aids *(Feelings about hearing impairment and hearing aids)*. Participants expressed feeling afraid to get a hearing assessment and that they could become too

dependent on hearing aids in their daily activities should they decide to wear them. One participant expected to feel stressed and expressed he would feel deficient if he used the hearing aids. One participant revealed feeling embarrassed to wear hearing aids and to be seen wearing hearing aids:

> *KN12: "…also a little embarrassed to wear it (hearing aid). Even when I want to go out people look. People will look, 'that person is like deaf, right?' (participant narrating what he perceived other people would say)"*

People's *Perceptions of hearing aids* also appeared to have an influence on their decision for hearing aid uptake. Some perceived wearing hearing aids as being uncomfortable and that much time would be taken in order to maintain them. After the hearing aid demonstration, one participant perceived that hearing aids would add on to their responsibilities in life:

> *SN3: "…for instance if I get my infection problem, an infection, discharge too, cannot (wear the hearing aid). The device would be damaged. So he device is already expensive, have to care for it rigorously. Another thing, adding on my responsibilities"*

Furthermore, the same participant perceived that wearing hearing aids would attract people's attention towards him:

> *'SN3: Definitely something strange that is attached to our body would become people's attraction. For me, those strange things I try to avoid'*

Another person perceived no difference in hearing when given a selection of hearing aids to wear during the demonstration and that the hearing aids were for those who could not hear completely:

KN12: "At that time (hearing aid demonstration) it was about the same (perception of hearing with and without hearing aid) … So took the decision (to buy hearing aid) later on. Maybe the device, maybe for people who really cannot hear at all"

Participants also reported *Feelings which developed following hearing demonstrations* that could serve as a hindrance to hearing aid uptake. One participant expressed feeling uncomfortable with the occlusion after the insertion of a sample earmould in his ear and after listening through the trial hearing aid. Another participant felt the hearing aid selected during the demonstration was unsuitable for her and expressed feeling uncomfortable during the demonstration:

KN9: "During the time she (audiologist) tested me (demonstrated hearing aid) she said if possible be quick because I have other people (patients). So I felt uncomfortable"

The participant added that she perceived the demonstration session was unsuccessful:

KN9: "…but when I wore the device she (audiologist) spoke I could not hear, because I could not focus actually, so I feel the test (hearing aid demonstration) failed today"

Participants also reported being *Unsure about hearing aid suitability* and *Perceiving a long adjustment* time to wear hearing aids if they chose to obtain them. Having *No awareness of sources for financial assistance* was also reported to be a factor hindering hearing aid uptake. However, one participant reported wanting to seek treatment at an earlier period of time but did not get an opportunity (*No opportunity*) to do so. Others mentioned their age (*Age factor*) as a factor contributing to their decision, either that they did not want to seek treatment when they were younger, or that being old might affect their ability to care for hearing aids:

SN4: "… I feel lazy to wear (hearing aids) it. At this old age, later need to handle (the hearing aid) it might fall or anything, need to care (for the hearing aid) but can't take care"

The above participant also added that she did not have any concerns regarding her hearing impairment because she accepted it as the act of God (*Religious factor*):

SN4: "I don't feel anything (when having difficulty chatting with friends), Alhamdulillah (all praise to God), just normal, used to it. When thinking about it, we think that we are a humble servant (of God). There are weakness in ourselves, what God has given us we are grateful for, there are others who worse (in worse condition) than us right…I have never regretted it (having hearing impairment), thankful with what I have"

6.2.2.6 Environmental factors that were perceived to hinder hearing aid uptake

Aspects of life that were external to the participants that hindered their decisions to acquire hearing aids were categorized under this factor grouping. The category most often reported by participants that affected their decision to acquire hearing aids was *Issues with hearing aids,* in particular the cost of purchasing hearing aids:

SA2: "…Not little, expensive. I heard a few thousands to buy the device (hearing aid)"

as well as the cost of maintaining hearing aids:

KA16: "…The device (hearing aid) is sensitive, need to care for it. It involves a high cost. The device is not cheap, costly for us to care for"

Maintenance of hearing aids was reported to be of concern when participants were informed by the audiologist that the aids could not be dropped or get wet, and that they could easily be broken. Participants also identified maintenance issues that had been reported to them by friends:

SN4: "…there's a friend here who sore it (hearing aid) some time ago, got broken quite quickly, (the friend) wore it for not nearly a year already broken…"

Participants were influenced by the hearing aid style reporting that its inconspicuousness was important and that it would affect their decision to acquire them:

KN12: "If the devices (hearing aids) were made smaller...there's a possibility (participant might wear hearing aids)"

The possibility of the need to replace hearing aids in the future was mentioned by one participant to be a barrier to his decision to buy hearing aids. The participant also perceived that the hearing aid could cause harm to the user:

SA6: "If wearing the device for a long time would cause harm to me… I would feel a little difficult (to decide to wear hearing aids)"

Some of the issues with hearing aids arose following the demonstration appointment. People reported that the hearing aids they put on were either noisy or did not enable them to hear more clearly than without hearing aids. One participant felt that the hearing aid even made hearing less clear:

KN12: "Not wearing it (hearing aid) can hear, wear it also can hear but not very clear. If put it on there was like interference"

Another participant reported that the functioning of the hearing aids in identifying directionality of sound and gauging sound distances affected their decision:

> *SN3: "Naturally we could identify where a voice comes from. When wearing the device, couldn't tell where from (where sound was coming from) …the distance from me could not tell how far. It's a new thing, I feel difficult (to adjust to this new experience)"*

About half of the participants reported some forms of negative behaviour or advice (*Attitudes of others towards participant)* which had an influence on their decision to acquire hearing aids. Some participants revealed that the ENT specialist gave them the impression that their hearing was fine and discouraged obtaining hearing aids:

> *KN6: "But now it's (hearing) ok, so no need to (wear hearing aids). On top of that, the doctor (ENT specialist) said, "no need to wear (hearing aids) la""*

Participants also revealed that the GPs they had seen as a point of referral would dismiss the idea of wearing hearing aids by commenting how costly they were or did not take any action following participants' complaints of hearing impairment:

> *KA15: "Every time I went there (health clinic) once in every five months for check-ups, I will complain (about hearing impairment). Already (complained to) three, four (doctors)… I have complained to many doctors but they seem to overlook it. They are not concerned about it"*

Some participants said that the Audiologists' remarks about the hearing aids such as the high cost, complicated maintenance, and difficulties with its usage affected their decisions. One participant reported that the audiologist rushed her to finish the hearing aid demonstration process:

KN9: "Firstly I go to the public hospital right, so she (audiologist) has limited time. She has many customers (patients) right, so she can't concentrate on me right…because in the time that she tested me (performed the demonstration) she said 'if possible please hurry a little madam, because I have other people (patients) still'"

Participants also revealed their concerns about society judging them as deaf, disabled or being in a lower status than the rest of the community:

KN12: "If I were to use the device (hearing aids), people look, "That person is like… "(Participant narrating what he perceived other people would say). My status will (viewed as) lower a little. Not that I want to indicate anything. Its already, it is what He (God) wants. It is fated"

Some participants reported not receiving any recommendations for hearing aids from health professionals *(Absence of recommendation from health practitioner)* either in the public or private services. They reported that some ENT specialists commented that the participants did not have a problem or that they should take nerve medication as the initial step to overcome their hearing problem. One participant reported being told by an ENT specialist that nothing could be done to for his hearing impairment, which led him to not pursue hearing aids:

KN5: "… because the first time I did (seek hearing help), he (ENT specialist) said there was nothing else, he said the nerves had problems. I asked the doctor "doctor, can't you do anything about the nerves?" "nothing can be done" the doctor said. After that, I decided not to go (to hospital for further intervention) anymore"

Audiologists were also reported by some participants to have not provided a clear recommendation that could aid the person to make a decision about hearing aids. One

participant who had seen an audiologist prior to the audiological appointment during the study period said that he did not receive a follow up appointment or recommendations for hearing aids by the audiologist. Another participant indicated that she did not feel encouraged to obtain hearing aids based on the session she had with the audiologist:

> *SN4: "The hospital (audiologist) did not really emphasize it because if they say that I have to use it, I better do (wear hearing aids), I will wear it if they put some emphasis for me to buy it. But, she (audiologist) neither not tell me to (wear hearing aids) nor encouraged me, so I am more inclined to not buy it"*

One participant with a unilateral hearing impairment who was interested in wearing hearing aids said that the audiologist she saw did not recommend hearing aids:

> *KN9: "She did not say my ear (hearing impairment) was very serious. It's just that she said my ear (hearing) is what they say as moderate to severe. Ha… so she did not suggest (hearing aid). Only I had thought for myself that it is better if I wear it (hearing aids)"*

Additionally, one participant felt that he could delay the decision regarding hearing aid use because the *Audiologist gave the option to monitor his hearing levels* while he considered whether or not to obtain hearing aids. However, for another participant, it was the *Observation of other hearing aid users* that hindered her in deciding to obtain hearing aids:

> *SN4: "…because I have a friend here who wore it (hearing aids) a long time ago broken too quickly, wore it for not even a year already broken"*

Some of the information provided by the audiologist was reported by participants to be incomplete *(Incomplete information)* and they found this unhelpful for them to pursue obtaining hearing aids:

SN5: "(The audiologist) only said that have to wear the thing (hearing aid) but for further information, there wasn't any… like I said I'm on the fence about wearing (hearing aids)"

Participants also indicated that some of the feedback provided to them by health professionals was ambiguous *(Ambiguous information)*:

SN4: "…the doctor (ENT specialist) said my ear is not exactly very deaf, (I) hear but still with problems. Basically the damaged part at the brain, he (ENT specialist) said. Hearing is not damaged, he (ENT specialist) said"

A few participants described how they would *Rely on the ENT specialist's decision* regarding hearing aid use which indicated that they would not proceed with amplification if the ENT specialist did not recommend them:

KA16: "Whichever that suits. Whether I can go for an operation or I must wear the assistive device, it's up to the specialist doctor (ENT specialist)"

Others also expressed *Reliance on their immediate family* to provide physical support in order for them to deal with processes following hearing aid purchase. *Long waiting time* for services at the hospital was an issue with one participant:

SA7: "Yes, it is already written there (a notice at the hospital ENT clinic), need to be patient it says, your turn will come. With me if too long (waiting time), I cannot (tolerate), my head aches, when there's headaches it gets dizzy"

6.2.2.7 Impression of activity limitations and participation restrictions during hearing aid demonstration that were perceived to hinder hearing aid uptake

Experiences during the hearing aid demonstration were also perceived to hinder participants' decisions to obtain hearing aids. One participant with a unilateral hearing impairment reported that she found that the hearing aid that she used in the hearing aid demonstration did not make her hear speech better *(Communication issues during hearing aid demonstration)*:

> *KN9: "When I asked my daughter to speak to me, I can't focus on her voice. So I couldn't hear. Compared to when I put on the hearing aids, when she speaks, and I am not wearing them (hearing aids), I can hear"*

Another participant felt that wearing hearing aids could create an obstacle to normal routines such as performing ablution prior to performing his prayers:

> *K12: "If I wear it (hearing aids) my activities will be limited right? Yes, for example it when I take my ablution, how is that going to be like? Because we plug it (earmoulds) in our ears, and we need spread water to the ears, right. "You have to remove, madam" said audiologist. That is the problem, an obstacle"*

6.2.2.8 Impression of improved activities and participation that were perceived to hinder hearing aid uptake

A few participants, including three participants who chose not to attend a hearing aid demonstration, perceived that their communication activities and participation had improved during the time between the first interview and the second interview. All of participants reported receiving medication for their ear related conditions following the consultation at the

hospital ENT clinic. These participants reported having no problems hearing their names called or having conversations (*Improved communication*) with family members and friends:

> *SN1: "Just normal. Chatting (with neighbours) just like the usual. Don't seem to have a problem, can hear"*

One participant reported that he no longer had problems communicating in noisy environments (*Improved activities in background noise*) and listening to talks (*Improved participation in talks)* in a large space:

> *KN6: "There's no more (communication) problems. When talking to people, or friends, its fine. When at prayers (at the mosque) also can hear the sermons, it's clear"*

6.2.2.9 Comparison of categories between adherers and non-adherers to hearing aid recommendation

Following the initial hearing consultations, all participants were recommended hearing aids by their audiologists. A total of 8 out of 23 participants, 4 from each hospital, did not adhere to hearing aid recommendations and chose not to proceed with hearing aid purchase at the hospital. However, one of the non-adherers reported that she intended to pursue hearing aid consultation from a private hearing care centre. Table 6.6 displays the factors that were perceived to support hearing aid uptake for each factor headings for the adherers and non-adherers to hearing aid recommendations. As mentioned earlier, the factor groupings in red indicate that these groupings only emerged during the second interview. Similarly, the categories in red indicate that either the category and/or its lower level category(s) emerged during the second interview. The numbers in parentheses represent the number of participants who contributed to the categories.

Table 6.6 Factors that were perceived to support hearing aid uptake between adherer and non-adherers

Personal Factors that were perceived to support hearing aid uptake	
Adherers	***Non-adherers***
1. Finding a solution to hearing problem (12) 2. Self-initiated (11) 3. Feelings about hearing impairment (11) 4. Desire to hear (9) 5. Other health-related conditions (8) 6. Character/behaviour pattern (7) 7. Internal influence on decision making (7) 8. Feelings following hearing aid demonstration (7) 9. Condition worsening (4) 10. Self-perceived hearing impairment (3) 11. To know underlying problem (3) 12. Age factor (2) 13. Religious factor (2) 14. Becoming baffled (1) 15. Preventive solution (1) 16. Stage of life (1) 17. Gets health back (1) 18. Interim solution (1)	1. Self-initiated (6) 2. Other health-related conditions (5) 3. Feelings about hearing impairment (4) 4. Finding a solution to hearing problem (4) 5. Internal influence on decision making (3) 6. Character/Behaviour pattern (3) 7. Self-perceived hearing impairment (4) 8. Preventive solution (2) 9. Desire to hear (1) 10. To know underlying problem (1)
Environmental factors what were perceived to support hearing aid uptake	
Adherers	***Non-adherers***
1. Relating to hearing aids (13) 2. Recommendation by health professionals in public service (12) 3. Recommendation by immediate family (11) 4. Access to outside funding (11) 5. Attitude towards participant (9) 6. Provision for hearing aid demonstration (6) 7. Recommendation by health professionals in private service (5) 8. Employment interest (4)	1. Recommendation by health professionals in public service (8) 2. Recommendation by immediate family (4) 3. Attitude towards participant (4) 4. Relating to hearing aids (2) 5. Confidence with service provider (1) 6. Hearing test experience (2) 7. Cost (2) 8. Recommendation by health professionals in private service (1) 9. Employment interest (1)

9. Confidence with service provider (2) 10. Hearing aid demonstration led to positive perceptions about hearing aid (3) 11. Safety issue (2) 12. Audiologist provide a choice of hearing aids during hearing aid demonstration (1) 13. Audiologist assisted in making hearing aid purchase at discounted price (1) 14. Satisfied with the audiology service (1) 15. Indirect influence of others (1) 16. Kinship relation with an ENT specialist (1)	10. Indirect influence of others (1) 11. Workplace hearing assessment (1) 12. Access to outside funding (1)
Activity Limitations & Participation Restrictions that were perceived to support hearing aid uptake	
Adherers	***Non-adherers***
1. Communication (14) 2. Activities in the community (5) 3. Group discussion (4) 4. Television (4) 5. Talks (3) 6. Phone (3) 7. General (2) 8. Difficulties in background Noise (2) 9. Shopping (2) 10. Travel (1)	1. Talks (1) 2. Communication (1) 3. Noise (1) 4. Phone (1) 5. Group discussion (1)
Impression of Improved Activities & Participation during hearing aid demonstration that were perceived to support hearing aid uptake	
Adherers	***Non-adherers***
1. Improved Communication (9) 2. Improved Telephone use (1)	(Nil)

Note. Numbers in parentheses represent the number of participants who contributed to the category. Categories in red indicate that either the category or its subcategory/s were contributed from interview 2 which were conducted within 1 to 2 months from interview 1. ENT = ear, nose, and throat.

For the adherers, *Personal factors that were perceived to support hearing aid uptake* consisted of the largest number of categories when compared to the other factors perceived to

support hearing aid uptake. Nevertheless, a large number of participants contributed to categories in other factor headings such as *Recommendation by Health Professionals in Public Service* (Environmental factors that were perceived to support hearing aid uptake) and *Communication* (Activity limitations and participation restrictions). Most of the factors perceived to support hearing aid uptake were identified during the first interview. For example, under the factor heading *Personal Factors that were perceived to support hearing aid uptake,* at least 17 categories were developed from codes derived in the first interview.

One hundred and twenty-two (122) new codes emerged during the second interview which was carried out either following the hearing aid demonstration session or after a certain period of time (for those who chose not to attend hearing aid demonstration session). The emergent of factor heading *Impression of Improved Activities and Participation during hearing aid demonstration that were perceived to support hearing aid uptake* from the adherers following the second interview indicate that the hearing aid demonstration sessions contributed to the factors perceived to support hearing aid uptake.

Additionally, Table 6.6 shows that the non-adherers also identified some factors that were perceived to support hearing aid uptake. However, the participants' decisions to not adopt hearing aids indicated that other factors influenced their decisions.

Table 6.7 presents factors that were perceived to hinder hearing aid uptake between the adherers and non-adherers. From the table it is observed that the non-adherers contributed most to the categories under the factor heading *Personal Factors that were perceived to hinder hearing aid uptake*. New codes emerged during the second interview indicating that the hearing aid demonstration or effects of time (as experienced by the 4 non-adherers who chose not to partake in the hearing aid demonstration and also interviewed within a similar

time frame as those who attended the hearing aid demonstration) have an influence to the non-adherers' decision on hearing aid uptake.

The adherers also contributed to the categories perceived to hinder hearing aid uptake for all factor headings except for Impression of Activity Limitations & Participation Restrictions during hearing aid demonstration that were perceived to hinder hearing aid uptake. This factor grouping resulted from a group of categories contributed by the non-adherers who attended hearing aid demonstrations.

Table 6.7 Factors that were perceived to hinder hearing aid uptake between adherers and non-adherers

Personal Factors that were perceived to hinder hearing aid uptake	
Adherers	***Non-adherers***
1. Unable to afford hearing aid cost (10) 2. Character/behaviour pattern (4) 3. Internal influence of decision making (4) 4. No interest (4) 5. Feelings about hearing impairment and hearing aid (3) 6. Perceives no problem with hearing (1) 7. Perceptions of hearing aids (1) 8. Age factor (1) 9. Unable to afford hearing aid maintenance costs (1)	1. Perceives no problem with hearing (7) 2. No interest (6) 3. Internal influence of decision making (5) 4. Perceptions of hearing aids (3) 5. Feelings about hearing impairment and hearing aid (2) 6. Character/behaviour pattern (2) 7. Concern hearing aid worsens hearing (2) 8. Unable to afford hearing aid cost (2) 9. Feelings following hearing aid demonstration (2) 10. Religious factor (2) 11. Age factor (1) 12. No opportunity (1) 13. No knowledge about hearing aids (1) 14. Unsure about hearing aid suitability (1) 15. Perceive hearing impairment can be treated using traditional medicine (1)

Environmental barriers what were perceived to hinder hearing aid uptake	
Adherers	***Non-adherers***
1. Issues with hearing aids (12) 2. Absence of recommendation from health practitioner in public service (4) 3. Attitude of others towards participant (4) 4. Reliance on ENT specialist's decision (2) 5. Absence of recommendation from health practitioner in the private service (1) 6. Incomplete information (1) 7. Ambiguous information from health practitioner (1) 8. Long wait time in public service (1) 9. Reliance on immediate family (1)	1. Attitude of others towards participant (8) 2. Issues with hearing aids (6) 3. Incomplete information (6) 4. Absence of recommendation from health practitioner in public service (5) 5. Reliance on ENT specialist's decision (3) 6. Ambiguous information from health practitioner (2) 7. Reliance on immediate family (1) 8. Unaware of hearing test existence (1) 9. Unaware of sources for financial assistance (1) 10. Outcome of medical intervention (2) 11. Audiologist gave an option to monitor hearing levels while deciding on hearing aids (1) 12. Observation of other hearing aid users (1)
Impression of Activity Limitations & Participation Restrictions during hearing aid demonstration that were perceived to hinder hearing aid uptake	
Adherers	***Non-adherers***
(nil)	1. Communication issues during hearing aid demonstration (1) 2. Obstruction to religious ritual (1)
Impression of Improved Activities & Participation that were perceived to hinder hearing aid uptake	
Adherers	***Non-adherers***
1. Improved communication (1)	1. Improved communication (3) 2. Improved participation win talks (1) 3. Improved activities in background noise (1)

Note. Numbers in parentheses represent the number of participants who contributed to the category. Categories in red indicate that either the category or its subcategory/s were contributed from interview 2 which were conducted within 1 to 2 months from interview 1. ENT = ear, nose, and throat.

6.2.2.10 Factors that were perceived to influence hearing aid uptake for each participant

Tables 6.8 to 6.29 display the factors perceived to influence hearing aid uptake for each of the 22 participants. The tables show that not all participants contributed to every factor grouping. For ease of display some of the words in the factor groupings are abbreviated: Activity limitations (AL), Participant restrictions (PR), Activities (A), Participation (P), hearing aid (HA), and hearing aid demonstration (HA demo).

Everyone exhibited various factors perceived to have both positive and negative influences regardless of their decisions on hearing aid uptake. The factors perceived to either support or hinder hearing aid uptake appeared to influence the participants differently. An example of this can be observed amongst the participants who chose not to attend the hearing aid demonstrations (KN6, SN1, SN4, and SN5). Despite showing no interest in hearing aids, all of them have identified factors perceived to support hearing aid uptake in addition to factors that were perceived to hinder hearing aid uptake: *No interest, Perceives no problem with hearing,* and *Attitude of others towards participant*.

Table 6.8 Factors perceived to influence hearing aid uptake for participant KN5

KN5 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Other health-related conditions (7) 2. Self-perceived HL (5) 3. Finding a solution to hearing problem (4) 4. Self-initiated (1) 5. Feelings about hearing impairment (1) 6. Character/ behaviour pattern (1)	1. Recommendation by health professionals in public service (13) 2. Attitude of others towards participant (2) 3. Workplace hearing assessment (2)	1. Unable to afford HA cost (4) 2. No interest (2)	1. Absence of Recommendation from health practitioner in public service (9) *2. Issues with HAs (6)* 3. Attitude of others towards participant (4) 4. Immediate family 5. Incomplete information (1) *6. Unaware of sources for financial assistance (1)*	-nil-	-nil-	-nil-	-nil-

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.9 Factors perceived to influence HA uptake for participant KN6

KN6 (did not participate in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Other health-related conditions (4) 2. Self-initiated (2) 3. Feelings about hearing impairment (2) 4. Finding a solution to hearing problem (2) 5. Self-perceived hearing impairment (2)	1. Recommendation by health professional in public service (5)	1. Perceives no problem with hearing (7) 2. Internal influence on decision making (3) 3. No interest (2)	1. Attitude of others towards participant (2) 2. Absence of recommendation from health practitioner in public service (2) 3. Incomplete information (2) 4. Outcome of medical intervention (1) 5. No knowledge about HAs (1)	-nil-	-nil-	-nil-	1. Improved communication (2) 2. Improved participation win talks (1) 3. Improved activities in background noise (1)

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.10 Factors perceived to influence HA uptake for participant KA7

KA7 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Finding a solution to hearing problem (6) 2. Age factor (6) 3. Feelings about hearing impairment (5) 4. Desire to hear (4) 5. Feelings following HA demonstration (4) 6. Self-initiated (3) 7. Interim solution (3) 8. Internal influence on decision making (2) 9. Other health-related conditions (2) 10. Stage of life (2) 11. Condition worsening (1) 12. To know underlying problem (1) 13. Religious factor (1) 14. Gets health back (1)	1. Recommendation by health professional in public service (16) 2. Relating to HAs (7) 3. Recommendation by immediate family (4) 4. Provision for HA demonstration (3) 5. Access to outside funding (3) 6. Attitude of others towards participant (1) 7. Safety issue (1) 8. Audiologist provide a choice of HAs during HA demonstration (1) 9. Satisfied with audiology service (1)	1. Internal influence on decision making (5) 2. Feelings about hearing impairment and HA (2) 3. Age factor (1)	1. Absence of Recommendation from health practitioner in public service (2) 2. Issues with HAs (1)	-nil-	-nil-	1. Improved communication during hearing aid demonstration (2)	-nil-

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.11 Factors perceived to influence HA uptake for participant KA8

KA8 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Self-initiated (10) 2. Finding a solution to hearing problem (5) 3. Desire to hear (4) 4. Preventive solution (1)	1. Recommendation by health professionals in public service (20) 2. Access to outside funding (14) 3. Relating to HAs (3) 4. Recommendation by immediate family (2) 5.	1. Unable to afford HA cost (10) 2. No interest (2) 3. Character/behaviour pattern (2) 4. Unable to afford HA maintenance costs (2) 5. Internal influence on decision making (3) 6. Feelings about hearing impairment and HA (1)	1. Issues with HAs (4)	1. Communication (1) -	-nil-	1. Improved communication during hearing aid demonstration (2) 2. Improved telephone use during hearing aid demonstration (1)	-nil-

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.12 Factors perceived to influence HA uptake for participant KN9

KN9 (participated in HA demonstration but wanted to pursue HAs at a private centre)							
Personal factors (supporting HA uptake)	**Environmental facilitators (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Finding a solution to hearing problem (4) 2. Self-perceived HL (1) 3. Desire to hear (1) 4. To know underlying problem (1)	1. Recommendation by immediate family (6) 2. Recommendation by health professionals in public service (6) 3. Hearing test experience (1) 4. Cost (1)	1. Feelings following HA demonstration (3) 2. No interest (2) 3. Internal influence on decision making (1) 4. No opportunity (1) 5. Unsure about HA suitability (1)	1. Absence of Recommendation from health practitioner in public service (3) 2. Incomplete information (3) 3. Issues with HAs (2) 4. Attitude of others towards participant (2)	1. Talks (6) 2. Group discussion (6 3. Communication (4) 4. Difficulties in background noise (2)	1. Communication issues during HA demonstration (2)	-nil-	-nil-

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.13 Factors perceived to influence HA uptake for participant KA10

KA10 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Feelings about hearing impairment (5) 2. Finding a solution to hearing problem (3) 3. Character/Behaviour pattern (2) 4. Condition worsening (1) 5. Desire to hear (1)	1. Recommendation by immediate family (6 2. Recommendation by health professional in private service (3) 3. Attitude of others towards participant (3) 4. Employment interest (1) 5. Relating to HAs (1) 6. Audiologist assisted in making HA purchase at discounted price (1) 7. HA demonstration led to positive perception about HA (1)	1. Unable to afford HA cost (2)	1. Issues with HAs (1)	1. Communication (13) 2. Television (2) 3. Telephone use (2) 4. Talks (1)	-nil-	1. Improved communication during hearing aid demonstration (1)	-nil-

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.14 Factors perceived to influence HA uptake for participant KA11

KA11 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Feelings about hearing impairment (5) 2. Finding a solution to hearing problem (2) 3. Feelings following HA demonstration (2) 4. Self-initiated (1) 5. Becoming baffled (1)	1. Relating to HAs (12) 2. Access to outside funding (7) 3. Attitude of others towards participant (4) 4. Recommendation by health professional in private service (2) 5. Recommendation by immediate family (1)			1. Communication (11) 2. Group discussion (6) 3. Travel (2) 4. Activities in the community (2) 5. Television (2)			

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.15 Factors perceived to influence HA uptake for participant KN12

KN12 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Self-initiated (2) 2. Internal influence on decision making (1)	1. Recommendation by health professionals in public service (12) 2. Recommendation by immediate family (2) 3. Relating to HA styles 4. Hearing test experience (2) 5. Attitude of others towards participant (2) 6. Access to outside funding (1)	1. Feelings about hearing impairment and HA (5) 2. Character/behaviour pattern (2) 3. Perception of HAs (2)	1. Issues with HAs (7) 2. Attitude of others towards participant (2)		1. Obstruction to religious ritual (2)		

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.16 Factors perceived to influence HA uptake for participant KA13

KA13 (deceased prior to HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Feelings about hearing impairment (5) 2. Finding a solution to hearing problem (4) 3. To know underlying problem (3) 4. Self-initiated (3) 5. Character/Behaviour pattern (1)	1. Recommendation by health professionals in public service (6) 2. Access to outside funding (2)	1. Internal Influence on decision making (1)	1. Absence of Recommendation from health practitioner in public service (3) 2. Issues with HAs (1) 3. Ambiguous information from health practitioner (1) 4. Attitude of others towards participant (1)	1. Activities in community (2) 2. Communication (1)			

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.17 Factors perceived to influence HA uptake for participant KA15

KA15 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Feelings about hearing impairment (9) 2. Self-initiated (3) 3. Condition worsening (3) 4. Finding a solution to hearing problem (3) 5. Feelings following HA demonstration (3) 6. Character/Behaviour pattern (2) 7. Other health-related conditions (2)	1. Recommendation by health professionals in public service (10) 2. Attitude of others towards participant (5) 3. Recommendation by immediate family (3) 4. Relating to HAs (3) 5. Access to outside funding (1)		1. Absence of recommendation from health practitioner in public service (2) 2. Attitude of others towards participant (2) 3. Issues with HAs (1)	1. Communication (15) 2. Difficulties in background noise (2) 3. General (2) 4. Shopping (1) 5. Television (1) 6. Group discussion (1)			

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.18 Factors perceived to influence HA uptake for participant KA16

KA16 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Self-initiated (2) 2. Age factor (2)	1. Access to outside funding (13) 2. Employment interest (7) 3. Attitude of others towards participant (6) 4. Recommendation by health professionals in public service (6) 5. Relating to HAs (4)	1. No interest (2) 2. Unable to afford HA cost (2)	1. Issues with HAs (3) 2. Reliance on ENT specialist's decision (3)	1. Communication (1) 2. Activities in community (2)		1. Improved Communication (1)	

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.19 Factors perceived to influence HA uptake for participant SN1

SN1 (did not participate in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Other health-related conditions (4)	1. Recommendation by health professionals in public service (6) 2. Recommendation by immediate family (3) 3. Attitude of others towards participant (1)	1. Perceives no problem with hearing (4) 2. No interest (1)	1. Incomplete information (2) 2. Attitude of others towards participant (1) 3. Reliance on immediate family (1) 4. Outcome of medical intervention (1)				1. Improved communication (3)

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.20 Factors perceived to influence HA uptake for participant SA2

SA2 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Feelings about hearing impairment (7) 2. Finding a solution to hearing problem (6) 3. Condition worsening (2) 4. Other health-related conditions (1)	1. Access to outside funding (7) 2. Recommendation by health professionals in public service (6) 3. Employment interest (6) 4. Recommendation by immediate family (5) 5. Attitude of others towards participant (5) 6. Relating to HAs (2) 7. Recommendation by health practitioner in private service (1)	1. No interest (3) 2. Character/behaviour pattern (2) 3. Unable to afford HA cost (2)	1. Incomplete information (3) 2. Issues with HAs (2) 3. Attitude of others towards participant (2) Absence of Recommendation from health practitioner in public service (1)	1. Group discussion (1) 2. Communication (1) 3. Shopping (1) 4. Telephone use (1)		1. Improved communication during hearing aid demonstration (1)	

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.21 Factors perceived to influence HA uptake for participant SN3

SN3 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Internal influence on decision making (3) 2. Self-initiated (2) 3. Self-perceived HL (2) 4. Feelings about hearing impairment (1) 5. Character/Behaviour pattern (1) **6.** Preventive solution (1) **7.** Finding a solution to hearing problem (1)	1. Recommendation by health professionals in public service (7) 2. Indirect influence of others (3) 3. Refer to audiologist 4. Attitude of others towards participant (2) 5. Confidence with service provider (1) 6. Cost (1)	1. Perceive hearing impairment can be treated using traditional medicine (3) 2. Concern HA worsens hearing (2) 3. No interest (2) 4. Perceptions of HAs (2) 5. Feelings following HA demonstration (2) 6. Internal influence on decision making (1) **7.** Perceives a long time is needed to get used to wearing HA following HA demonstration (1) 8. Character/behaviour pattern (1)	1. Issues with HAs (7) 2. Incomplete information (3) 3. Attitude of others towards participant (3) 4. Ambiguous information from health practitioner (1) 5. Audiologist gave an option to monitor hearing while deciding on HAs (1)	1. Group discussion (4) 2. Communication (2) 3. Television (1)			

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.22 Factors perceived to influence HA uptake for participant SN4

SN4 (did not participate in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Other health-related conditions (4) 2. Self-initiated (2)	1. Recommendation by health professionals in public service (11) 2. Recommendation by immediate family (2)	1. Perceives no problem with hearing (7) 2. Religious factor (3) 3. Internal influence on decision making (1) 4. No interest (1) 5. Age factor (1)	1. Absence of Recommendation from health practitioner in public service (10) 2. Incomplete information (4) 3. Issues with HAs (2) 4. Reliance on ENT specialist's decision (2) 5. Audiologist 6. Ambiguous information from health practitioner (1) 7. Attitude of others towards participant (1) 8. Observation of other HA users (1)				1. Improved communication (2)

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.23 Factors perceived to influence HA uptake for participant SN5

SN5 (did not participate in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Other health-related conditions (2) 2. Internal influence on decision making (2) 3. Self-initiated (1) 4. Feelings about hearing impairment (1) 5. Preventive solution (1) 6. Character/Behaviour pattern (1)	1. Recommendation by health professionals in public service (8) 2. Recommendation by health professionals in private service (2) 3. Relating to HAs (1) 4. Employment interest (1)	1. No interest (3) 2. Perceptions of HAs (2) 3. Feelings about hearing impairment and HA (2) 4. Perceives no problem with hearing (1)	1. Attitude of others towards participant (2) 2. Reliance on ENT specialist's decision (2) 3. Issues with HAs (1) 4. Absence of Recommendation from health practitioner in public service (1) 5. Incomplete information (1) 6. Unaware of hearing test existence (1)	1. Talks (2) 2. Telephone use (1)			

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.24 Factors perceived to influence HA uptake for participant SA6

SA6 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Desire to hear (3) 2. Self-initiated (1) 3. Self-perceived HL (1)	1. Access to outside funding (6) 2. Recommendation by health professionals in public service (4) 3. Relating to HAs (2) 4. Provision for HA demonstration (1)	1. Unable to afford HA cost (1)	1. Issues with HAs (3)	1. Communication (2)			

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.25 Factors perceived to influence HA uptake for participant SA7

SA7 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Desire to hear (3) 2. Feelings following HA demonstration (3) 3. Self-initiated (2) 4. Internal influence on decision making (2) 5. Feelings about hearing impairment (1) 6. Character/Behaviour pattern (1) 7. Other health-related conditions (2) 8. Self-perceived HL (1) 9. Finding a solution to hearing problem (1)	1. Recommendation by health professionals in public service (4) 2. Recommendation by immediate family (4) 3. Kinship relation with an ENT specialist (3) 4. Relating to HAs (2) 5. Recommendation by health professionals in private service (1) 6. Attitude of others towards participant (1) 7. Provision for HA demonstration (1) 8. Employment interest (1)	1. No interest (1) 2. Character/ behaviour pattern (1)	1. Reliance on immediate family (2) 2. Long waiting time in public service (1)	1. Communication (3)		1. Improved Communication (1)	

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.26 Factors perceived to influence HA uptake for participant SA8

SA8 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Internal influence on decision making (2) 2. Desire to hear (2) 3. Finding a solution to hearing problem (2) 4. Feelings following HA demonstration (2) 5. Feelings about hearing impairment (1) 6. Self-initiated (1) 7. To know underlying problem (1)	1. Access to outside funding (4) 2. Recommendation by immediate family (2) 3. Attitude of others towards participant (2) 4. Relating to HAs (2) 5. Recommendation by health professionals in public service (1) 6. Confidence with service provider (1) 7. Indirect influence of others (1)	1. Unable to afford HA cost (3)	1. Issues with HAs (3)	1. Communication (2)		2. Improved Communication (1)	

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.27 Factors perceived to influence HA uptake for participant SA9

SA9 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Feelings about hearing impairment (4) 2. Feelings following HA demonstration (3) 3. Finding a solution to hearing problem (1) 4. Other health-related conditions (1)	1. Recommendation by health professionals in public service (9) 2. Recommendation by immediate family (2) 3. Relating to hearing aids (2) 4. HA demonstration led to positive perceptions about HA (2) 5. Confidence with service provider (1) 6. Recommendation by health professionals in private service (1)	1. Feelings about hearing impairment and HA (2)	1. Absence of Recommendation from health practitioner in private service (2) 2. Attitude of others towards participant (2) 3. Issues with HAs (1)	1. Communication (3)			

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.28 Factors perceived to influence HA uptake for participant SA10

SA10 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Feelings about hearing impairment (4) 2. Desire to hear (4) 3. Internal influence on decision making (2) 4. Character/Behaviour pattern (2) 5. Finding a solution to hearing problem (2) 6. Self-initiated (1) 7. Other health-related conditions (1) 8. Religious factor (1) 9. Feelings following HA demonstration (1)	1. Recommendation by health professionals in public service (7) 2. Recommendation by immediate family (4) 3. Access to outside funding (3) 4. Attitude of others towards participant (2) 5. Relating to HAs (2) **6.** HA demonstration led to positive perceptions about HA (1)	1. Perceptions of HAs (1)	1. Issues with HAs (1)	1. Communication (4) 2. Talks (4)			

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

Table 6.29 Factors perceived to influence HA uptake for participant SA11

SA11 (participated in HA demonstration)							
Personal factors (supporting HA uptake)	**Environmental factors (supporting HA uptake)**	**Personal factors (hindering HA uptake)**	**Environmental factors (hindering HA uptake)**	**AL & PR (supporting HA uptake)**	**Impression of AL & PR during HA demo (hindering HA uptake)**	**Impression of improved A & P during HA demo (supporting HA uptake)**	**Impression of improved A & P (hindering HA uptake)**
1. Internal influence on decision making (2) 2. Self-perceived HL (2) 3. Self-initiated (1) 4. Feelings about hearing impairment (1) 5. Character/Behaviour pattern (1) 6. Other health-related conditions (1) 7. Desire to hear (1) 8. Finding a solution to hearing problem (1)	1. Recommendation by health professionals in public service (8) 2. Relating to HAs (5) 3. Recommendation by immediate family (3) 4. Access to outside funding (3) 5. Recommendation by health practitioner in private service (1) 6. Provision for HA demonstration (1) 7. Safety issue (1)	1. Unable to afford HA cost (2) 2. Perceives no problem with hearing (1) 3. Internal influence on decision making (1)	1. Issues with HAs (2)	1. Difficulties in background noise (2)		1. Improved Communication (1)	1. Improved Communication (1)

Note. Numbers in parentheses represent the number codes contributed to the category. Categories in red indicate that either the category, and/or its lower level category, and/or at least one code were contributed from interview 2 which were conducted within 1 to 2 months from interview 1.

CHAPTER 7

DISCUSSION

7.1 Introduction

The purpose of this thesis is to explore the factors influencing Malaysian adults' hearing aid uptake using a mixed method research approach. Due to the unavailability of published data on the demographics and hearing profiles of Malaysian adults consulting for audiological evaluation, a quantitative research method was used to investigate the demographic and audiological profiles of Malaysian adult hearing consulters in the Klang Valley. Hospital records of adults seeking hearing consultation for the first time were obtained from two hospitals located in the Klang Valley i.e., HSB and HTAR, which were locations approved for data collection by the Ministry of Health Malaysia. The findings were used to guide the sampling criteria for participants in the qualitative study and will be discussed in relation to the literature in the following sub-headings.

The factors perceived to influence hearing aid uptake amongst Malaysian adults in the Klang Valley were grouped into 8 factor groupings. These factor groupings were developed using the terminologies adopted by the WHO's ICF because of the ICF's recognition as an international classification system for describing health, and health-related conditions, and the increasing effort to encourage the use of the ICF (i.e., by the development of the ICF Core Sets for hearing loss) within the audiology community. The results of this part of the study are consistent with previous findings, and additionally, revealed other factors which are related to cultural identity, beliefs, support system, and health delivery. The following sub-headings provide a discussion on these findings.

7.2 Part I: Quantitative study

In this study, demographic and audiological profiles of first-time adult hearing consulters from two hospitals were identified. Overall, the demographic findings of each hospital were similar. In both hospitals, there was a relatively equal number of male and female consulters. This finding is different from the findings of Duijvestin et al. (2003). In that study on adults' help-seeking behaviour, there were more men (76%) who had consulted for their hearing problems out of a group of 115 hearing consulters. The difference in the gender distribution between the previous and the current study may be due to the differences in the age of the target population. The current study targeted adults aged ≥ 18 years, whereas the Duijvestin et al. (2003) study targeted adults aged ≥ 55years. By referring to the Tables 4.1 and 4.5, it can be observed most of the female consulters in both hospitals were in the younger age groups.

In addition, the distribution of ethnicity was similar for both hospitals, whereby the Malay consulters made up the majority of consulters followed by the Indian and Chinese consulters. This finding is not consistent with the general ethnic composition of residence in the district of Shah Alam (district of HSB) and Klang (district of HTAR), whereby the majority ethnic group is Malay followed by Chinese and Indian (Department of Statistics Malaysia, 2010). The differences between the proportion of Chinese and Indian consulters in both hospitals may suggest that some hearing consulters choose to either seek consultation for their hearing impairment at private hearing care facilities, or not seek help at all. A study on adult hearing consulters at private hearing care facilities may provide information that can enhance our understanding of the behaviour of all adult hearing consulters in Malaysia.

The difference in demographics between HSB and HTAR was in the distribution of age: the majority of consulters in HSB (57%) were between the age of 40 and 69 years, while

the majority of consulters in HTAR (54%) were between the age of 50 and 69 years. In the study conducted by Duijvestin et al. (2003) the mean age of the adult hearing consulters was 69 years (SD= 6.8). While the age of the participants in the current study appeared to be younger than participants in the Duijvestin et al. (2003), these differences are likely due to differences in research design, methodology, and target population.

Another study reported a more similar age group to the current study. O Mahoney, Stephens, and Cadge (1996) studied factors motivating hearing consulters to seek audiological consultation for the first time in two audiology centres in London and Cardiff. Questionnaires probing the instigators to hearing help seeking and the consequences of hearing impairment for participants and others were administered, and completed by 95 patients aged between 26 and 85 years old. The mean age of participants recruited in London was 52.7 years (SD = 15.7), while the mean age of participants seen in Cardiff was 67.6 years (SD = 9.8). The mean age of participants grouped together was 60.7 years (SD = 14.8).

There were similarities in the audiological results from HSB and HTAR. In both hospitals, more than 70% of the adult consulters had pure tone audiometric thresholds greater than 20 dB HL. (See sub-headings 4.2.1.1 and 4.2.2.2). Participants in HSB exhibited a higher percentage of unilateral hearing impairment than those in HTAR (47% and 13.2%, respectively). By using the MOH classifications of hearing impairment, it was found that the majority of hearing consulters had either mild or moderate hearing impairments. However, it is important to highlight that for both hospitals, there were first-time consulters diagnosed with severe and profound hearing impairment. Further investigation into the reasons for delaying hearing help seeking would provide meaningful information into understanding help-seeking behaviours of Malaysian adults with hearing impairment.

One difficulty with comparing the audiological results with previous findings is due to the differences in target information and objectives of the studies. For example, the Duijvestin et al. (2003) study identified hearing help-seekers who had consulted for their hearing impairment. Audiometric testing was carried out and hearing levels were averaged over the frequencies 0.5, 1, 2, and 4 kHz, similar to the information sought in the present study. However, because the objective of their study was to investigate factors influencing the help-seeking behaviours, the audiometric profiles of the consulters were not reported.

Another difficulty in making comparisons is due to the difference in the way the data is presented. An example is the study by Saunders et al. (2016) which utilised health behaviour change models in order to understand the hearing help seeking behaviours, and hearing aid uptake and outcomes of adults who sought hearing consultation for the first time in Portland, Oregon. Participants' age and audiometric thresholds (4-frequency hearing threshold averages in separate ears) were obtained and described using mean and range values. In the Part II of the present study, the participants' ages are presented in interval scale while the 4-frequency averaged audiometric thresholds are presented in nominal scale of categories of hearing impairment. The choice of data presentation was made in view of the objective to use the demographic and audiological findings to guide the sampling criteria for Part II of the study.

One important finding in this study was the hearing aid uptake rate between the hospitals (i.e. 29.4% for HSB and 55.1% for HTAR). The numbers represent the percentage of participants who accepted hearing aids following consultation and hearing aid recommendation by an audiologist. This hearing aid uptake rate in HTAR is comparable to the study conducted by Meyer et al. (2011). They investigated the actions taken by adults who failed a telephone-based hearing screen. Out of the adults who sought help from various sources (i.e. audiologists, hearing service or hearing providers, and family doctors) and were

recommended hearing aids, 46% had hearing aids fitted. However, the hearing aid uptake rate for both hospitals in this study was lower than reported in a study in Portland, Oregon, US, whereby 72.4% of help seekers accepted hearing aids after consulting an audiologist (Saunders et al., 2016). The help-seekers were 167 adults age 55- 89 years who had sought hearing help for the first time, with the majority (59.3%) noticing hearing difficulties for more than 5 years.

A contribution to the high uptake rate in the Saunders et al. (2016) study could be the duration of experience of hearing impairment reported by the majority of the participants. A period of more than five years is a common duration that people wait from noticing hearing difficulties to seeking help (Fischer et al., 2011; Kochkin, 2009). The other reason is possibly due to the participants' eligibility for free hearing aids, as 96% of the participants in their study were veterans. How long the participants in the present study had previously noted their hearing impairment before consulting an audiologist is not known. This information could be sought in future research in order to better understand the help-seeking behaviour of Malaysian adults with hearing impairment.

The objective of Part 1 of this study was to describe the demographic and audiological profiles of first-time adult hearing consulters at public hospitals in the Klang Valley, Malaysia, as the information is not available. The National Survey on Ear and Hearing Disorders conducted by the Ministry of Health Malaysia (Ministry of Health Malaysia, 2007) provided important information regarding the prevalence of hearing impairment amongst Malaysians and insight into the help-seeking behaviour of Malaysians with hearing impairment. However, the demographic and audiological profiles of these help-seekers were not reported. Findings from the current study have provided information on gender, age, and the ethnic distribution of Malaysian adult help seekers, as well as their level and laterality of hearing impairments, and hearing aid uptake rate. However, these finding are limited to the

adults living in the Klang Valley. Therefore, it is recommended that future studies expand this research to the whole country to obtain more complete information about this topic.

Additionally, this study has provided information that served to guide the sampling criteria for Part II of the study. As a result, apart from other criteria, adult participants for the qualitative part of the study were selected to be: 1) within the age of 40 to 69 years and 50 and 69 years old for HSB and HTAR, respectively, and 2) of Malay ethnicity. This study was the first of its kind in Malaysia. By using the specific purposive sampling method of homogeneous sampling, the participants were narrowed into a specific subgroup for greater depth of information. Future investigations in the area of help-seeking and hearing aid uptake should incorporate other participants from different ethnic backgrounds.

7.3 Part II: Qualitative study

7.3.1 Participant demographic and audiological findings

The interview participant selection criteria were guided by the results of analysis of the quantitative part of this study. In order to avoid cultural and language barrier with other ethnic groups, the researcher's Malay ethnicity was also considered when selecting the ethnicity of the participants for this part of the investigation. As a result, the participants for the qualitative study were of Malay ethnicity, and aged between 40 and 69 years old for those who were recruited at HSB, and between 50 and 69 years old for those who were recruited at HTAR.

Overall, 15 male and 7 female participants participated in this part of the investigation with the majority having moderate to severe hearing impairments. More than half of the participants were aged between 60 and 69 years, and were either unemployed or had retired. According to the report of household income and basic amenities survey 2014 (Department of Statistics Malaysia, 2015) the median household income of the group of participants (RM 2500) was well below the national median income of RM 4585. Moreover, four participants fell in the "poor" category as defined by the Malaysian Economic Transformation Programme unit (Jala, 2015).

It is important to point out that the description of demographic and audiological findings of the participants who participated in the interviews is crucial as to facilitate transferability of this research findings to another context (Graneheim & Lundman, 2004). The findings from the qualitative analysis of the interviews may be transferable to other first time hearing consulters bearing similar demographic and audiological profiles to those reported in this study. In order to fully describe and understand the factors influencing hearing

aid decision for the Malaysian population, this investigation should be extended to help seekers of other ethnicities, and age ranges.

7.3.2 Factors perceived to support and hinder Malaysian adults' hearing aid uptake

This study has revealed numerous factors influencing Malaysian adults' hearing aid uptake. These were grouped into factor groupings, which were developed based on the terminology used by the WHO ICF Model. The ICF Model consists of two parts: 1) Functioning and Disability, and 2) Contextual factors, each consists of two components. The second component of the first part i.e. Activities and Participation, and both components of the second part i.e. Environmental Factors and Personal Factors, are relevant to the scope of this study. All of the components can be expressed in both positive and negative terms, which resulted in the generation of eight factor groupings, each containing a cluster of similar factors identified in this study:

1) Personal positive factors that were perceived to support hearing aid uptake,
2) Environmental factors that were perceived to facilitate hearing aid uptake,
3) Personal factors that were perceived to hinder hearing aid uptake,
4) Environmental factors that were perceived to hinder hearing aid uptake,
5) Activity limitations and participation restrictions that were perceived to support hearing aid uptake,
6) Impression of activity limitations and participation restrictions during hearing aid demonstration that were perceived to hinder hearing aid uptake,
7) Impression of improved activities and participation during hearing aid demonstration that were perceived to support hearing aid uptake, and

8) Impression of improved activities and participation that were perceived to hinder hearing aid uptake.

The study findings are discussed in relation to these factor groupings in the following sections.

7.3.2.1 Personal factors perceived to support hearing aid uptake

This personal factors influencing hearing aid uptake were grouped into those that were perceived to support hearing aid uptake, and those that were perceived to hinder hearing aid uptake.

Aspects of the individuals' own feelings and attitudes about hearing impairment and hearing aids were found to support hearing aid uptake. For example, the individuals' *Feelings about hearing impairment* and *Feelings following hearing aid demonstration,* were perceived to support hearing aid uptake. Similarly, Winsor (2011) reported that the women in her study expressed an emotional response to their hearing impairment, most commonly frustration, which the author described as an aspect of psychosocial impact of hearing impairment that facilitated their hearing aid uptake. The current qualitative investigation, however, uncovered a more diverse range of feelings which served to support hearing aid uptake. These included: fear, embarrassment, helplessness, stress and worry, feeling inferior, and a feeling of isolation. These factors related to feelings can be considered to be relevant to personality. In the past, Gatehouse (1994) reported that the personality of people with hearing impairment seeking hearing help was significantly related to hearing aid use. By administering the Crown-Crisp Experiential Index (Crown & Crisp, 1979), Gatehouse assessed aspects of hearing aid users' personality through the measurement of depression, hysteria, and obsession.

The aspect of the individual's feelings is an important factor found in this study as demonstrated by the category *Feelings following hearing aid demonstration.* This factor was perceived both to support and hinder hearing aid uptake. Participants felt that the hearing aid demonstration session allowed them to experience listening through the hearing aids, which evoked either positive or negative reactions towards the hearing aids.

Hearing aid demonstration is a common service offered by many hearing aid providers from various parts of the world. In Malaysia, hearing aid demonstration is a standard procedure in the MOH hospitals (Perkhidmatan Audiologi KKM, 2014b). It is evident in this study that the hearing aid demonstration influences the adults' decisions on hearing aid uptake. This highlights the need for further research on hearing aid demonstration and its influence on individuals' decision regarding hearing rehabilitation.

This investigation revealed a number of categories relating to the individual's overall character/ behaviour pattern that also supported hearing aid uptake: *Character/Behaviour pattern, Self-initiated, and Internal influence on decision making.* An example of this is the Character/Behaviour pattern whereby some participants expressed dislike having to ask repeatedly for clarification or shunning from conversations due to inability to follow conversations. These results are consistent with previous findings regarding the individuals' own attitudes towards hearing loss, including acceptance of, and coping with hearing loss (Garstecki & Erler, 1998; Helvik et al., 2008; Humes et al., 2003; Robertson et al., 2012; Swan & Gatehouse, 1990).

The category *Internal influence on decision making* where participants considered the importance of their hearing and weighed the benefits of getting a solution to their hearing problems, and *Self-initiated* are factors associated with high internal locus of control (Garstecki & Erler, 1998). Previously, locus of control, which is an aspect of an individual's

personality, was identified as an important factor related to hearing aid uptake (Cox et al., 2005; Garstecki & Erler, 1998; Kelly-Campbell & Allan, 2016). Cox et al. (2005) explained that locus of control measures explore the individual's belief in his or her ability to exert control over events or situations. The influence of locus of control is supported by a recent study conducted by Kelly-Campbell and Allan (2016), through a content analysis of verbal behaviour of hearing aid adopters and non-adopters. The authors found that participants who adopted hearing aids exhibited significantly higher internal locus of control than the non-adopters.

This investigation also revealed categories related to the individual's perception of hearing impairment, hearing aid, and health that support hearing aid uptake: *Self-perceived hearing impairment, Condition worsening, Finding a solution to hearing problems, To know underlying problems, Preventive solution, Interim solution, Desire to hear, Other health-related conditions* and *Gets health back.* Examples can be shown from the categories *Self-perceived hearing impairment* and *Conditioning worsening* which reflect the participants' awareness of their hearing problems. This finding supports the finding of the theme self-perceived hearing by Winsor (2011) which referred to the realisation of hearing impairment, its effects on the individual and others, and how it was dealt with.

Other examples the individual's perception of hearing impairment, hearing aid, and health that support hearing aid uptake are the *Preventive solution* and *Interim solution*. Participants in this study viewed that wearing hearing aids could prevent hearing impairment from becoming worse (*Preventive solution*), hence their choice to adopt them. However, one participant chose to buy hearing aid as a temporary solution (*Interim solution*) while pursuing a more permanent medical intervention for his hearing impairment. This finding is similar to the Laplante-Lévesque et al. (2010a) study which uncovered the category 'preventive and interim solution' as a factor that both positively and negatively influencing hearing aid

uptake. This category underlined how adults with acquired hearing impairment "viewed their decision as ongoing and reversible, framing it in the context of the slowly degenerating health condition that is age-related hearing impairment." (p. 505).

In the Laplante-Levesque et al. (2010a) study, participants were offered four rehabilitation options: hearing aids, group communication, individual communication programme, and no intervention. The participants who chose either the group communication or individual communication options had considered the sustainability of those intervention options (interim solution) against hearing aids, which they perceived would reduce their ability to hear without them. Others who chose an intervention programme as opposed to doing nothing did so to prevent their hearing disability from becoming greater (preventive solution). In the current study, *Preventive solu*tion and *Interim solution* are presented as separate category as they refer to the participants' reasons for choosing hearing aid against no intervention, whereas in the previous study the participants described how they weighed between 3 intervention options against no intervention.

Supporting factors related to age and stage of life was found in this study. The category *Age factor*, which was perceived to support hearing aid uptake, corroborates previous investigations that found associations between age and hearing aid uptake (Gussekloo et al., 2003; Helvik et al., 2008; Humes et al., 2003; Kochkin, 2007; Kochkin, 2009; Robertson et al., 2012). Moreover, with the use qualitative investigation, this study was to provide an insight into how this factor influences the individuals to adopt or reject hearing aids. One participant in this study felt more prepared to seek hearing help at an older age and did not feel the need to do so at a younger age.

A new category elicited in this study was *Stage of life*, which was perceived to support hearing aid uptake. In this study, stage of life referred to retirement when the participants had

more free time to seek rehabilitation for the hearing impairment. This category is somewhat relevant to the category convenience previously found through a qualitative investigation (Laplante-Lévesque et al., 2010a), which included issues of schedule and time commitment, location, travel time, and ease of access.

Another category unique to this study was the category of *Religious factor*. Participants who reported this category perceived that it was their religious duty to maintain their health and wellbeing. It is mentioned in the Quran *"We have created the human from a (sperm) drop, a mixture, testing him; we made him to hear and see"* (Quran, 76: 2). This verse reveals that the ability to hear is a *fitrah* (human nature). The duty to seek self-improvement is also mentioned in the Quran *"Surely God does not change the condition on someone until they change that which is in themselves"* (Quran, 13:11). This verse is a calling by God to His servants to seek for improvements in both physical and spiritual terms. This category reflects the significance of religious belief in influencing adults' decisions on rehabilitation (Ariff & Beng, 2006; Kricos, 2000). However, this finding only reflects the beliefs of the religion of Islam which is observed by the Malay participants in this study. Due to the multi-religious beliefs of the Malaysian population, it is important to extend this investigation to include hearing consulters of other religious beliefs.

7.3.2.2 Environmental factors perceived to support hearing aid uptake

The influence of others that supports hearing aid uptake is reflected in this study in a number of categories: Recommendations by health professionals in public service, Recommendations by health professionals in private service, Recommendations by immediate family, Attitudes of others towards participants, Indirect influence of others, Kinship relationship with and ENT specialist, and workplace hearing assessment.

Recommendations by health professionals, either in the public or private services, was found to be an important environmental factor that was perceived to support hearing aid uptake. The participants in this study reported receiving referrals for a hearing assessment and recommendations to wear hearing aids by various health professionals including: ENT specialists and/or medical officers in the ENT clinic, general practitioners, audiologists, medical specialists other than ENT specialists, other personnel in the healthcare field, hearing aid dispensers, and traditional medicine practitioners. This is consistent with the findings in a previous study investigating motivators for hearing consultation for new patients who were seen in two audiology centres in London and Cardiff (O Mahoney et al., 1996). Twenty-one out of 95 participants aged between 28 and 85 years reported that they were motivated either by their general practitioner, ENT surgeons, consultants in the Care of the Elderly, or matrons of a residential home for the elderly to attend a hearing consultation. In the MarkeTrak VIII study, Kochkin (2009) reported that audiologists (26.4%), ear doctors (18.2%), and family doctors (6.8%) were amongst the many factors influencing first-time hearing aid owners to adopt hearing aids.

The categories *Recommendation by immediate family* and *Indirect influence of others* further echoes previous findings on the influence of others on rehabilitation decisions (Kochkin, 2009; Kochkin, 2012; Laplante-Lévesque et al., 2010a; Winsor, 2011). The participants in this study acknowledged the roles of their immediate family members in suggesting and encouraging them to wear hearing aids. Their observation of other hearing aid users appeared to be benefitting from the hearing aids had motivated the participants to pursue hearing aids. For one participant, having a family relationship with an ENT specialist (*Kinship relationship with an ENT specialist)* supported her hearing uptake as the audiology appointment was arranged for her by the ENT specialist.

The category *Attitude of others towards participants* in this study was perceived to support hearing aid uptake. Attitudes was previously reported as a personal aspect of the individual with hearing impairment, as discussed by Knudsen et al. (2010). However, based on the ICF framework, attitudes refers to those of people external to the individual with hearing impairment, and not those of the individual with hearing impairment (World Health Organisation, 2001), hence its position as part of the environmental factors. In the ICF, attitudes is defined as the "observable consequences of customs, practices, ideologies, values, norms, factual beliefs, and religious beliefs" (p. 190).

In this study, the aspects of the category attitude of others towards participants that were perceived to support hearing aid uptake were consistent with previous reports on family member's support for hearing aid adoption (Laplante-Lévesque et al., 2010a; O Mahoney et al., 1996) and being motivated by family doctors, other health professionals, and employers (O Mahoney et al., 1996). Interestingly, some of the participants in the present study expressed negative attitudes of others that were perceived to support hearing aid uptake.

One fascinating example of this reaction is a decision of one participant to adopt hearing aids to avoid being called a deaf (stigmatisation) by friends or society, whenever he cannot effectively participate in communication. It appeared that this participant was motivated to overcome receiving the negative attitudes about his hearing impairment by taking actions to reduce or eliminate such behaviours. The action taken by people to overcome stigma is referred to as positive stigma (Shih, 2004). In the article examining the resilience and empowerment in overcoming stigma, Shih (2004) investigated three processes that stigmatised individuals used (i.e. compensation, strategic interpretations of the social environment, and focusing on multiple identity, to successfully overcome the harmful effects of stigmatisation). The compensation process, which involves developing skills (for example by using hearing aids to improve listening ability) to compensate for the stigma, could explain

the action taken by some of the participants in this investigation. This finding is unique in this study and has not been reported in previous studies on factors influencing hearing aid uptake. Further investigation is needed to understand the extent of the influence of attitudes of others toward people with hearing impairment on hearing aid uptake and whether this factor is shared by people with hearing impairment of various ages.

Aspects *Relating to hearing aids* was an important factor supporting hearing aid uptake. The choice of hearing aid styles, availability of various technologies, and perception of improvement in hearing with hearing aid wear (during hearing aid demonstration) were reported to influence hearing aid uptake in this study. In the series of the MarkeTrak VIII publications, one instalment reported on the key influencing factors that might persuade a reluctant hearing aid user to purchase hearing aids (Kochkin, 2012). Kochkin discovered that one in four of potential hearing aid users reported that the possibility of purchasing software upgrade (instead of new hearing aids) or the availability of more fashionable hearing aids could increase their motivation to adopt hearing aids. Additionally, 39.9% of the survey respondents with moderate-severe hearing impairment stated that the ability to hear the soft sounds of life with hearing aids would highly increase their motivation to purchase hearing aids.

Categories related to finances (i.e., *Cost, Access to outside funding*, and *Audiologist assisted in making hearing aid purchase at discounted price)* were found in this study to facilitate hearing aid uptake. Financial costs have been discovered to support hearing aid uptake, as some people are eligible for subsidised hearing aids (Laplante-Lévesque et al., 2010a; Winsor, 2011). In this study, one participant perceived the actual cost of hearing aids as a motivator to hearing aid uptake as the participant discovered it to be less than what was initially expected. This finding could possibly be an exceptional case as it was only reported by one participant. Furthermore, previous studies have found people perceive that hearing

aids are very expensive rather than cheaper than expected (Laplante-Lévesque et al., 2010a; Winsor, 2011).

In Malaysia, *Access to outside funding* could contribute to reducing the financial cost of purchasing hearing aids for those who are eligible and this was perceived as a factor that supported hearing aid uptake for many participants in this study. Civil servants and government pensioners are eligible for hearing aid funding from the public service department, while others could apply form various governmental or non-governmental agencies as previously explained (see sub-heading 2.3.2.2.4). Other financial sources for hearing aid purchase proves to be an important factor to motivate hearing aid adoption in other countries, as demonstrated in the MarkeTrak VIII study. Kochkin (2012) demonstrated that in the US, 66.6% of respondents with moderate to severe hearing impairment and half of people with mild hearing impairment who do not own hearing aids reported that complete coverage of hearing aids by their insurance company would highly motivate them to adopt hearing aids.

In Australia, Laplante-Lévesque, Hickson, et al. (2012) investigated predictors to intervention uptake (hearing aids, communication programmes and no intervention) amongst adults with hearing impairments. In their study, participants who initially decided to obtain hearing aids were followed up six months later to discover their intervention uptake and assess their beliefs related to their intervention uptake via a newly developed Intervention Questionnaire (IQ: Laplante-Lévesque, Hickson, & Worrall, 2011). By using bivariate logistic regression, it was found that age, gender, living situations, education, eligibility for subsidised hearing services, hearing impairment, self-reported hearing disability, time since onset of hearing impairment, perceived suitability of group communication programme, other people's recommendation of the communication programmes, and concerns about hearing aid cost and practices were not significant intervention uptake predictors. The significant predictor to

hearing aid uptake was found to be application to subsidised hearing services as participants who made the application were significantly more likely to obtain hearing aids. This study was the first attempt into identifying predictors to hearing aid uptake. The newly developed IQ, which was based on the seven factors identified to influence rehabilitation decisions (Laplante-Lévesque et al., 2010a), could be modified to incorporate the factors found in the present study. Then, the study by (Laplante-Lévesque, Hickson, et al., 2012) could be replicated to determine predictors to hearing aid uptake in Malaysia.

Facilitators related to the audiology service were found in this study: *Satisfied with audiology service*, *Confidence with service provider*, *Hearing test experience*, *Provision for hearing aid demonstration*, *Hearing aid demonstration led to positive perceptions about hearing aids*, and *Audiologist provide a choice of hearing aids during hearing aid demonstration*. The categories *Satisfied with the audiology service*, *Confidence with service provider*, and *Hearing test experience* reflect how much the participants valued the quality of service, which influenced their decisions on hearing aid uptake. A somewhat similar finding was reported by Laplante-Lévesque, Knudsen, et al. (2012) who studied the perspectives of adults with hearing impairment on hearing help seeking and rehabilitation. The authors reported the category seeking hearing aid provider clinic, whereby participants described being influenced by the quality of service they thought they would receive when choosing a hearing aid provider. The participants more often made an evaluation on their experiences with help-seeking and rehabilitation rather than describing them, for example, some adults described their fascination with the audiological assessment. Both of the findings above suggest that people with hearing impairment value clinicians who have a genuine interest in them. These findings supports a previous qualitative research which highlighted the importance of trust and client-centeredness during the rehabilitation process (Laplante-Lévesque, Hickson, & Worrall, 2010c).

Hearing aid demonstration proved to be an important aspect of the rehabilitation process in this study as reflected by the categories *Provision for hearing aid demonstration* and *Hearing aid demonstration led to positive perceptions about hearing aids*. These categories show that even an on-the-spot hearing aid trial could have a positive impact on the individuals' perception of hearing aid wear. Kochkin (2012) reported that 23.6% of people with mild hearing impairment and 37.1% of those with moderate-severe hearing impairment are highly likely to adopt hearing aids if there is a provision for a 90-day trial period. This is an indication that further studies would be beneficial to understand aspects of hearing aid demonstration session that influences hearing aid uptake.

Other facilitators to hearing aid uptake found in this study were *Employment Interest* and *Safety issue*. Contrary to the current findings Kochkin (2007) found that 3 out of 10 of the survey respondents who did not adopt hearing aids reported that their occupation did not warrant them to get hearing aids. A more recent report on key influencing factors determining hearing aid purchase in the US, only about 15% of hearing aid non-adopters would be highly motivated to purchase hearing aid if they felt their work performance was affected by the hearing impairment (Kochkin, 2012) The category *Safety issue* reported in this study is consistent with previous findings whereby safety concerns was reported as one of the reasons influencing the intent to purchase hearing aids for adults with hearing impairment (Kochkin, 2007, 2012).

7.3.2.3 Activity limitations and participation restrictions perceived to support hearing aid uptake

The findings in this study on activity limitations and participation restrictions facilitating hearing aid uptake corroborates previous research findings (Humes et al., 2003; Laplante-Lévesque et al., 2010a; Winsor, 2011). People with hearing impairment experience

communication difficulties in their everyday lives (Dalton et al., 2003; Hickson & Worrall, 2003; Kelly-Campbell & Plexico, 2012; Ruben, 2000) that restrict their daily activities and participation in life situations. Activity limitations and participation restrictions were highly reported by hearing help seekers with the possible need for hearing aid fitting and rehabilitation (Helvik et al., 2006). Helvik et al. (2006) studied life consequences of hearing impairment of 343 patients who were referred for hearing consultation and rehabilitation, almost half (49.6%) of which had previous hearing aid experience.

The concepts of "activity limitations" and "participation restrictions" were introduced for the disability and handicap factors in the Hearing Disability and Handicap Scale (HDHS; Hallberg, 1998), which was used in the study. Activity limitations and participation restrictions were reported to be significantly higher for experienced hearing aid users than non-hearing aid users. Although this study was aimed at describing the life consequences of hearing impairment amongst the hearing help seekers, it highlighted the important effects of hearing impairment i.e. activity limitations and participation restrictions, that could play a role in rehabilitation decisions.

In a more recent study, Lockey, Jennings, and Shaw (2010) used a narrative approach to reveal an overarching theme of meaningful participation in life situations and events that were associated with use and non-use of hearing aids. Three themes were uncovered: 1) meaningful participation without the use of hearing aids, 2) barriers to participation, and 3) meaningful participation through hearing aid use participants, which represented a continuum of participation depending on the social and environmental experiences in the lived context. The study demonstrated the key factor facilitating the use of hearing aids by the participants which is being able to participate in meaningful social activities. Although the above 2 studies were regarding help-seeking and hearing aid use, the results of the present study confirms that

activity limitations and participation restrictions extends it influence on decisions regarding hearing aid uptake.

7.3.2.4 Impression of improved activities and participation during hearing aid demonstration that are perceived to support hearing aid uptake

The category *Impression of improved activities and participation during hearing aid demonstration* was newly discovered in this study which was perceived to support hearing aid uptake. The participants who contributed to this category expressed perceiving improvements in hearing ability (through subjective assessment) while trialling hearing aids during a hearing aid demonstration session. This finding demonstrate that individuals value meaningful participation through hearing aid use which was found to be a key factor facilitating hearing aid use (Lockey et al., 2010).

7.3.2.5 Personal factors perceived to hinder hearing aid uptake

As mentioned in the subheading 7.3.2.1, the aspect of the individual's feelings is an important factor found in this study as it was found not only facilitating, but also hindering hearing aid uptake. An example is the category *Feelings about hearing impairment and hearing aid use* which reflects the feelings expressed by some participants: embarrassment, (i.e., to be seen wearing hearing aids); afraid, (i.e., of potentially becoming too dependent on hearing aids in their daily activities); stressed, and feeling of deficiency. This is contrary to the findings by Winsor (2011) who found the emotional response of the research participants to facilitate hearing aid uptake.

The category *Feelings following hearing aid demonstration* was also perceived to hinder hearing aid uptake. To some participants the hearing aid demonstration session evoked

negative reactions towards the hearing aids which influenced their decision on hearing aids. Further studies that can provide information useful to improving the hearing aid demonstration protocol at the MOH audiology clinic would be useful.

This study revealed a number of categories related to individual's perception of hearing impairment and health that were hindering hearing aid uptake: *Perceives no problem with hearing, Perceptions of hearing aids, Unsure about hearing aids' suitability*, *Perceive a long adjustment time to wearing hearing aids following hearing aid demonstration, Concern hearing aid worsens hearing*, and *No interest*.

The category *Perceives no problem with hearing* found in this study supports the previous findings by Brink et al. (1996) who found that adults who have hearing impairment but who have not sought consultation perceived their hearing impairment as relatively insignificant and demonstrated a passive acceptance of hearing impairment. This is further supported by the findings from the MarkeTrak VII survey, which reported that 50% of their respondents cited that an obstacle to hearing aid adoption was that their hearing impairment was too mild (Kochkin, 2007).

Examples of the participants' reports that contributed to the category *Perception of hearing aids* in this study are: discomfort when wearing hearing aids, owning hearing aid as an additional responsibility, maintaining hearing aids as time consuming, hearing aids are meant for people who are deaf, and hearing aids attract people's attention. The perceived inconveniences that comes with hearing aid ownership is consistent with the report from the Kochkin (2007) study which revealed that 41% of individuals with hearing impairment respondents in their study stated the hassle of hearing aids as an obstacle to hearing aid adoption. Additionally, hearing aid stigma was also cited as a reason for hearing aids non-adoption. Thirty-six percent of the study respondents indicated that they would be

embarrassed to wear hearing aids in public, or that hearing aids would make them look disabled.

New categories elicited related to perception of hearing impairment and health were perceived to hinder hearing aid uptake were *Perceives a long adjustment time to wearing hearing aid following hearing aid demonstration* and *Unsure about hearing aid suitability*. Some of these categories can be attributed to lack of knowledge about hearing impairment and hearing aids. Information gathering or informed decision making was discovered as a significant factor facilitating hearing aid uptake (Winsor, 2011).

In a study on obstacles to adults' adoption of hearing aids, Kochkin (2007) reported unavailability of information as a significant barrier to hearing aid uptake for almost 50 % of his survey respondent with hearing impairment who do not have hearing aids. Iverson, Howard, and Penney (2008) investigated the Internet use of information gathering in the healthcare field in general and discovered that almost half of their participants reported making health-related behavioural changes which resulted from using the internet for finding health information. Although that study only examined online information gathering, it nevertheless suggests the importance of the impact of information gathering within the hearing health field.

The importance of information to health related decisions is supported by the findings in the study on clients' experiences with shared decision making in rehabilitative audiology (Laplante-Lévesque et al., 2010c). One of the important aspects of decision making process described by the participants is receiving information about intervention options. The impact of information gathering and informed decision making has never been investigated in the Malaysian context, hence future research in this area is recommended.

The factors related to the individual's overall character/behaviour pattern that was earlier reported to facilitate hearing aid uptake (refer sub-heading 7.3.2.1) was also found to be a hindering factor. The category Character/Behaviour pattern found to be hindering hearing aid uptake is exemplified by reports that wearing hearing aids would be difficult or that the participant wants to avoid people's attention. Another example is the category *Internal influence on decision making* where participants expressed wanting to make the decision on hearing aids on their own after considering advice from health professionals. One participant had a pre-conceived belief that he did not require hearing aids and felt validated when receiving advice against hearing aids from an ENT specialist. Interestingly, some participants simply expressed having *No interest* in either getting the hearing assessment or hearing aids.

Hindering factors related to personal finances were also found in this study: *Unable to afford hearing aid cost* and *Unable to afford hearing aid maintenance costs*. This findings corroborates the findings from the MarkeTrak VII survey (Kochkin, 2007) whereby 64% of the respondents stated the reason cannot afford hearing as an obstacle to adopting hearing aid. Additionally, 52% of the respondent reported that hearing aids are expensive to maintain. The above categories are also relevant to the socioeconomic factor previously reported Kochkin (2009), who found that in the US, where universal government subsidy is unavailable, income was not a predictive factor to hearing aid adoption.

Similarly, in Malaysia, hearing aid purchase is the responsibility of the persons with hearing impairment. According to the Report of Household Income and Basic Amenities Survey 2014, the median monthly household income in the urban area in Malaysia was RM 5156.00 (Department of Statistics Malaysia, 2015). In this study, all except for one participant had household income levels below the median income in urban area. Furthermore, one participant had a monthly household income below the poverty level of RM 760.00 (household income), while three other participants were in the extreme poverty level, which

was defined as having household income less than RM 460.00 per month (Jala, 2015). The lower income levels of participants in this study could have contributed to the decision on hearing aid uptake. However, the correlation between the household income of participants in this study and the hearing aid adoption cannot be measured due to small recruitment size. Therefore, further research can be undertaken to establish a relationship between socioeconomic status and hearing aid uptake, and whether this relationship has an effect on application for funding.

The category *Age factor* found in this study was not only perceived to support hearing aid uptake, but also perceived as a hindrance. Two participants revealed different perspectives regarding the age factor: one participant felt he was reluctant to seek help at younger age, while another participant viewed being older as an obstacle to hearing aid use because the ability to handle and care for hearing aids is poorer. From the MarkeTrak VIII survey, Kochkin (2009) found a relationship between age and hearing aid adoption whereby hearing aid adopters were significantly older than hearing aid non-adopters (Mean age= 70 versus 58 years; Median age: 74 versus 60 years). Further study incorporating participants from a wider age range could provide more insight on the influence of age on hearing aid uptake amongst Malaysian adults.

In this study the new factor related to religion was also found to hinder hearing aid uptake. The participant contributing to this category regarded the hearing impairment as the will of God and perceived the hearing impairment as fate. The view of the condition as the will of God may be attributed to the verse in the Quran: *"No affliction comes about but by Allah's permission; and whoever believes in Allah, He guides aright his heart; and Allah is Cognizant of all things"* (Quran: 64:11).

Another new factor related to cultural belief was found in this study to hinder hearing aid uptake: *Perceives hearing impairment can be treated using traditional medicine.* The one participant who contributed to this regarded the traditional remedies using natural and local resources. In Malaysia, healing using traditional medicine extends to a wide range of conditions and illnesses and is commonly practiced by all races (Ariff & Beng, 2006). However, there is no evidence on the effectiveness of traditional remedies for hearing impairment. Further study is recommended to understand the extent of this practice for hearing impairment amongst adults with hearing impairment in Malaysia.

7.3.2.6 Environmental factors perceived to hinder hearing aid uptake

Factors related to other people's influence were found to also hinder hearing aid uptake: *Absence of recommendation from health practitioner in public service*, *Absence of recommendation from health practitioner in the private service*, *Reliance on ENT specialist's decision*, *Audiologist gave an option to monitor hearing levels while deciding on hearing aids*, *Attitudes of others towards participant*, *Observation of other hearing aid users*, and *Reliance on immediate family*. The findings of the category *Absence of recommendation from health practitioner* supports previous research findings.

In the MarkeTrak VII study, Kochkin (2007) found that 46% of respondents reported that professionals such as ENT specialist (35%), audiologist (32%), family doctor (29%), or hearing instrument specialist (20%) influenced their decisions not to adopt a hearing aid. The report of negative influence of medical and hearing health related professionals on hearing aid uptake is not unusual. In a study on factors influencing rehabilitation decisions of adults with hearing impairment, Laplante-Lévesque et al. (2010a) found that some of the participants decided not to obtain hearing aids based on their health clinicians' recommendations against hearing aid uptake. In a thematic analysis of a study on facilitators and barriers to hearing aid

uptake, Winsor (2011) found that the audiologist and medical professional influenced her study participants to not adopt hearing.

Additional findings such as the category *Reliance on ENT specialist's decision* suggest that many participants anticipate some form of advice or recommendation and passively accept recommendations by the health professionals. Reliance on the medical practitioner's decision is a well-documented behaviour in medical-related decision making (Flynn, Smith, & Vanness, 2006; Levinson, Kao, Kuby, & Thisted, 2005; Smith, Dixon, Trevena, Nutbeam, & McCaffery, 2009). Belcher, Fried, Agostini, and Tinetti (2006) explored the views of older adults regarding participation in medication-related decision making. The variability of perceptions of patients playing any role in decision making was the primary theme that emerged in this study. Three subthemes further described the participants' perception of patient participation in medication decision making: 1) patients do not want to participate in decision making, 2) patients cannot be a part of decision making, and 3) patients can and should participate in medication decision making. The first subtheme demonstrated how participants in the study want to be told what to do by their doctors (passive acceptance), and expressed trust and confidence in their doctors' decisions.

Notably, negative *Attitudes of others towards participants* were perceived to hinder hearing aid uptake. Participants reported receiving discouraging remarks by audiologists, ENT specialists, general practitioners, family members, and employer about their hearing impairments and hearing aid use. Findings from the MarkeTrak VII study indicated that other than health professionals, decisions adults with hearing impairment to not adopt hearing aids were also influenced by the opinions of their spouses (28%) and children (18%). Similarly, van den Brink et al. (1996) found that participants who sought hearing help from their doctors but chose not to try hearing aids were influenced by their significant others who were of the opinion that hearing aid use is disadvantageous.

Concerns over the societal attitudes (stigma) towards hearing impairment and hearing aids were also perceived by many participants in this study to hinder their hearing aid uptake. While stigma of hearing impairment and its influence on hearing help seeking and hearing aid use have been investigated before (Garstecki & Erler, 1998; Meister, Walger, Brehmer, von Wedel, & von Wedel, 2008; Southall et al., 2010; Wallhagen, 2010), studies investigating its influence on hearing aid uptake are scarce.

Kochkin (2007) reported that nearly half of the MarkeTrak VII survey respondents cited stigma a reason for non-adoption of hearing aids. Ten statements related to stigma were presented to the respondents, with a few of them fairly similar with those expressed by participants in this study: make you look disabled, people treat you differently, make you look weak and feeble, and make you look mentally slow. Amongst the hearing aid non-adopters, 36% indicated that they would be embarrassed top wear hearing aids in public, or that hearing aids would make them looked disabled, 16% felt that hearing aids make one look weak and feeble, and about 20% felt that people would make fun of hearing aid users or hearing aids make one look mentally slow. From this study it is evident that stigma towards hearing aid use is apparent and perceived by the participants to hinder influence hearing aid uptake. People's perception of stigma and ways of dealing with stigmatisation of hearing impairment and hearing aids need to be explored further in the Malaysian context to gain understanding of the issue and develop strategies to help people with hearing impairment to deal with the issue.

For a few participants in this study *Observation of other hearing aid users* were perceived to hinder hearing aid uptake. They reported observing other hearing aid users who did not appear to have improved listening ability when wearing hearing aids or listening to complaints about hearing aids. This is consistent with the findings in the study by Laplante-Lévesque et al. (2010a) where the category other people's experiences were found to serve as a negative influence to hearing aid uptake.

Barriers related to information was found in this study: *Incomplete information*, *Ambiguous information from health practitioner*, *Unaware of hearing test existence*, *No knowledge about hearing aids*, and *Unaware of sources for financial assistance*. Reports of no knowledge regarding hearing impairment and hearing aids is not unusual as a survey in the US also revealed that nearly half of respondents with hearing impairment reported not having sufficient knowledge about their hearing impairment and how to deal with it (Kochkin, 2007).

The categories *Ambiguous information from health practitioner* and *Incomplete information* suggest that either the information delivery by the health professional was not effective, or the participants were unable to understand the information provided to them. There could also be a mismatch between information provided by the health professional and the way it may be perceived by the patients (Klein et al., 2011). Previous studies have found poor recall and understanding of the audiologists' explanations of the hearing mechanism and audiogram displayed by adults (Watermeyer, Kanji, & Mlambo, 2015) and caregivers of children attending audiological assessment (Watermeyer, Kanji, & Cohen, 2012), although the final diagnoses and recommendations were correctly recalled and understood. Both of the studies conducted by Watermeyer et al. (2012) and Watermeyer et al. (2015) observed absence of any form of customisation of information-giving towards the communicative needs of the clients, and the audiologists did not seem attuned to the clients' communication needs and signals. Grenness, Hickson, Laplante-Lévesque, Meyer, and Davidson (2015) found that in the initial audiological rehabilitation consultations, patient-centred communication were seldom observed, for example, little time was given to explaining diagnostic results and lack of client engagement as most of the consultation time was spent with the client listening to the audiologist talk. This could affect the patients understanding and acceptance of their audiological diagnoses, which may affect their rehabilitation decisions.

A vital aspect of client participation is information sharing by both the client and clinician (Laplante-Lévesque et al., 2010c). Information gathering and informed decision making has been found to influence hearing aid uptake (Kochkin, 2007; Winsor, 2011). Client participation during rehabilitation decision making may be impeded if effective communication between client and clinician is not achieved.

In an article on promoting the participation of adults with acquired hearing impairment in their rehabilitation decisions, Laplante-Lévesque, Hickson, and Worrall (2010b) discussed the approaches taken in audiology to promote client participation (i.e. client-centeredness, joint goal setting, and shared decision making). However, the authors also highlighted the scarcity of studies undertaken in audiology to investigate the extent of client participation in audiological rehabilitation and to understand the perceptions of clients and clinicians on the various approaches that promote client participation. Indeed, this area of study in audiology is at its infancy in Malaysia, hence, further research is advocated to expand knowledge and practice of rehabilitative audiology in the country.

In this study, factors related to hearing aids were also found to serve as barriers to hearing aid uptake. The issues with hearing aids perceived by many participants in this study revolved around the hearing aid style, hearing aid maintenance, perceived disadvantages to hearing with hearing aids, perceptions that hearing aids can cause harm to the hearing, and cost. Hearing aid image as a barrier to hearing aid uptake is related to the perceived stigma associated with use of hearing aids (Kochkin, 2007; Wallhagen, 2010). Additionally, Kochkin (2012) demonstrated that 37.8% of the non-adopters with moderate-severe hearing impairment in their study rated hearing aid invisibility as a top influencing factor that could motivate them to purchase hearing aids.

The participants in the present study also reported perceived disadvantages to hearing with hearing aids following a brief trial during a hearing aid demonstration. This finding is consistent with previous report on attitudes towards hearing aids that was found to be an obstacle to adult non-adoption of hearing aids (Kochkin, 2007). In a MarkeTrak VII report, 68% of the hearing aid non-adopters indicated that a barrier to hearing aid adoption was some aspect of hearing aids. The respondents reported that the top barriers were perceptions that hearing aids: do not work well in noise (48%), do not restore normal hearing (47%), pick up background noise (45%), and whistle as the result of feedback (44%).

Interestingly, one of the issue with hearing aid found in this study is perceived harm to hearing with hearing aid use. This perception is likely due to lack of knowledge regarding hearing aids, and possibly, about hearing impairment in general. Although this specific report was not found in literature elsewhere, Kochkin (2007) found that insufficient knowledge about hearing impairment, where to get tested, or where to purchase hearing were reasons for not purchasing hearing aids for 46% of his respondents who did not adopt hearing aids. Cost of hearing aids and maintenance are factors known to hinder hearing aid uptake (Garstecki & Erler, 1998; Kochkin, 2007; Laplante-Lévesque et al., 2010a; Winsor, 2011) and this inherent aspect of hearing aid purchase and use was also present in this study.

The current study also found factors related to logistics that served as barrier to hearing aid uptake. This is represented by the category *Long waiting time in public service* where one participant expressed the having to wait a long time to be seen by the health professional as a deterrent to attending additional follow-ups at the clinic. This finding is somewhat similar to the findings in the study by Laplante-Lévesque et al. (2010a) that reported the convenience category as a factor that serve both as a positive and a negative influence to hearing aid uptake. This category was earlier described in terms of location

(Milhinch & Doyle, 1990), but was expanded in the study by Laplante-Lévesque et al. to include schedule and time commitment, travel time, location, and ease of access.

7.3.2.7 Impression of activity limitations and participation restrictions during hearing aid demonstration perceived to hinder hearing aid uptake

The finding *of Impression of activity limitations and participation restrictions hindering hearing aid uptake* is a new category found in this study. This was reported by one participant who expressed experiencing more difficulty listening to conversation (subjective evaluation) while trialling a hearing aid during the demonstration session which limited his ability to hear, compared to not wearing hearing aids. Additionally, another participant perceived wearing hearings aid would obstruct the Islamic ritual of ablution. The ablution is a cleansing ritual of parts of the body involving the face, frontal part of the head, ears, arms, and feet, which is conducted five times daily prior to performing the obligatory prayers. The participant found the need to remove hearing aids prior to the ablution ritual as an obstacle to adopting hearing aids.

7.3.2.8 Impression of improved activities and participation perceived to hinder hearing aid uptake

The findings of the category *Impression of improved activities and participation perceived to hinder hearing aid uptake* indicate that some participants were more concerned about their ear-related medical problems which were alleviated with medical treatment. Despite having accompanying hearing impairment, the participants appeared to not perceive it significant enough to warrant intervention.

7.3.2.9 Factors influencing hearing aid uptake between the adherers and non-adherers

When comparing the categories perceived to support hearing aid uptake and those perceived to hinder hearing aid uptake between the adherers and non-adherers to hearing aid recommendation, a key finding was observed: the influence of hearing aid demonstration. New codes derived from the second interview of the hearing aid adherers contributed to the emergent of the factor heading *Impression of Improved Activities & Participation during hearing aid demonstration that were perceived to support hearing aid uptake*, indicating that the hearing aid demonstration sessions contributed to the factors perceived to support hearing aid uptake.

Similarly, for the non-adherers new codes were generated following the second interview. However, the codes resulted in the development of factor grouping *Impression of Activity Limitations & Participation Restrictions during hearing aid demonstration that were perceived to hinder hearing aid uptake*. For the non-adherers who attended hearing aid demonstrations, the session resulted in negative impressions towards some activities and participation which contributed to their decisions to not adopt hearing aids. An example of the influence of hearing aid demonstration can be seen from the participant KN9 (see

Table 6.12) who decided to not proceed with hearing aid fitting with the audiologist at the hospital, but nonetheless expressed the intention to pursue amplification at a private hearing centre. Some of the categories shown by KN9 following the hearing aid demonstration that may have contributed to this decision were *Communication issues during hearing aid demonstration*, *Feelings following hearing aid demonstration*, and *Attitudes of others towards participant* (in the case of KN9, the negative attitude of the audiologist).

As previously mentioned, hearing aid demonstration is a standard procedure in the Malaysian public audiology service following hearing aid recommendation to patients diagnosed with hearing impairment. The Standard Operating Procedure for the management of adults with hearing impairment outlines the process for a hearing aid demonstration (Perkhidmatan Audiologi KKM, 2014b). At the beginning of the session, the client-oriented scale of improvement (COSI) is administered to establish the patient's hierarchy of listening needs. Next, the audiologist makes a selection of hearing aids that have specifications, which could potentially meet the listening needs specified by the patient. The selected hearing aids are programmed according to the patient's audiometric thresholds either via the programming software of the hearing aid, or using the Real Ear to Coupler Difference (RECD) method. Then, one by one the programmed hearing aids are fitted to the patient so that the audiologist could get feedback and comments regarding their perception listening with each of the hearing aids. At the end of the 1-hour demonstration session, the patient decides on whether to wear a hearing aid(s) or not.

The provision of a hearing aid trial is known to motivate potential hearing aid adopters to want to buy the aids (Kochkin, 2012). However, the trial period mentioned in the Kochkin study was for 90 days whereas the patients in the Malaysian public audiology clinics are subjected to more than one hearing aid to try within a fraction of a 1-hour session. Up until the early 2000 no studies had been conducted addressing pre-fitting hearing aid orientation

and its effectiveness (Kemker & Holmes, 2004) and neither has the effectiveness of the pre-fitting protocol at the Malaysian audiology service been investigated. Therefore, there is a need to conduct further research relating to the efficacy of hearing aid demonstration and its effects on hearing aid uptake.

Another important finding is that the hearing aid adherers contributed codes to the factors perceived to hinder hearing aid uptake and similarly, the non-adherers contributed codes to the factors perceived to support hearing aid uptake. The display of factors both perceived to support and hinder hearing aid uptake by each participant indicate the complexity of the hearing aid decision making process and supports the overarching theme of dynamism (Winsor, 2011) that recognised the dynamic inter-relation of various factors for each individual. This suggests that participants weigh a number of influencing factors against their personal needs, preferences, and beliefs, in order to reach their final decisions regarding hearing aid uptake.

7.4 Summary

Findings from the qualitative study corroborates previous findings, as well as revealed new categories that were perceived by the participants to influence their decisions on hearing aid uptake. Some of the new categories elicited are related to hearing aid demonstrations, perceptions of hearing aids and its use, stage of life, and religious factor. Tables 7.1 and 7.2 provide lists of new categories found in this study.

Table 7.1 New categories that were perceived to support hearing aid uptake

Factor groupings	Categories
Personal factors	1. Other health-related conditions (13) 2. Feelings following hearing aid demonstration (7)

	3. Religious factor (2) 4. Stage of life (1)
Environmental factors	1. Provision for hearing aid demonstration (6) 2. Hearing test experience (2) 3. Hearing aid demonstration led to positive perceptions about the aids (3) 4. Kinship relation with ENT specialist (1)
Impression of improved activities and participation during hearing aid demonstration	1. Improved communication during hearing aid demonstration (8) 2. Improved telephone use during hearing aid demonstration (1)

Table 7.2 New categories that were perceived to hinder hearing aid uptake

Factor groupings	**Categories**
Personal factors	1. Internal influence on decision making (9) 2. Character/Behaviour pattern (6) 3. Feelings about hearing impairment and hearing aid use (5) 4. Religious factor (2) 5. Age factor (2) 6. Feelings following hearing aid demonstration (2) 7. Unsure about hearing aid suitability (1) 8. Perceive a long adjustment time to wearing hearing aids following hearing aid demonstration (1) 9. Perceive hearing impairment can be treated using traditional medicine (1)
Impression of activity limitations and participation restrictions during hearing aid demonstration	1. Communication issues during hearing aid demonstration (1) 2. Obstruction to religious ritual (1)
Impression of improved activities and participation	1. Improved communication (4) 2. Improved participation in talks (1) 3. Improved activities in background noise (1)

By using the ICF terminologies, it was possible to group the categories perceived to support and hinder hearing aid uptake into personal and environmental factor groupings (contextual factors), and factor groupings related to activities and participation. These factor groupings provide a clear and invaluable insight on the participants' perceptions of the hearing healthcare service and may serve as a guide for the audiologists and other hearing care professionals to improve on the hearing healthcare service. Gaps in knowledge and possibility of future research were identified which will be highlighted in the following chapter.

CHAPTER 8

CONCLUSIONS

8.1 Introduction

Hearing impairment affects an estimated 328 million adults worldwide (World Health Organisation, 2016a) and yet only about 10% of adults with hearing impairment use hearing aids (Mathers et al., 2000). Hearing aid adoption rates varies across countries, from about 20 to 30% in Sweden, US, and the United Kingdom (Kochkin, 2012; Zhao et al., 2015), to as low as 1 to 8% in China and India (Zhao et al., 2015).

Previous studies have investigated factors influencing hearing aid uptake (Jenstad & Moon, 2011; Knudsen et al., 2010; Kochkin, 2012; Meyer & Hickson, 2012; Ng & Loke, 2015) and have attempted to understand them from the perspectives of the individuals with hearing impairment (Laplante-Lévesque et al., 2010a; Laplante-Lévesque, Knudsen, et al., 2012; Winsor, 2011). Differences in healthcare systems, audiological services, cultural, and religious background influence people's health behaviours (Ariff & Beng, 2006; Kricos, 2000; Zhao et al., 2015), therefore the factors previously identified to influence hearing aid uptake may not entirely apply in the Malaysian context. As there is an absence of published studies pertaining to hearing help seeking and hearing aid uptake in the Malaysian context, this study was undertaken to fill in the gap in knowledge and to uncover other factors that serve to motivate or hinder decisions on hearing aid uptake amongst Malaysian adults with hearing impairment

The categories found in the present study were grouped according to the classification system set by the WHO's ICF and revealed contextual factors (i.e. personal factors and

environmental factors), and factors related to activities and participation as well as activity limitations and participation restrictions that were perceived to either support or hinder hearing aid uptake. Specifically, the categories were grouped under eight factor headings, each indicating the positive (supportive) or negative (hindrance) influence on decisions on hearing aids.

The personal factor influencing hearing aid was divided into two factor groupings: 1) Personal factors perceived to support hearing aid uptake, and 2) Personal factors perceived to hinder hearing aid uptake. While there were many categories that served singly to either support or hinder hearing aid uptake, a few were identified serving both as facilitator and hindrance to hearing aid uptake: Internal influence on decision making, Feelings about hearing impairment, and Feelings following hearing aid demonstration.

New categories identified relating to perceptions about hearing aids were found to either support or hinder hearing aid uptake which are attributed to the participants' knowledge, or the lack of it, about hearing aids. Other new categories that were found to support hearing aid uptake was *Stage of life*, *Perceives hearing impairment can be treated using traditional medicine* and *Religious factor*. The two latter categories are unique to this study as they signify the cultural and religious identities of the participants in this study and their influence on the participants' rehabilitation decision making.

Two factor groupings made up the environmental factors influencing hearing aid uptake: 1) Environmental factors perceived to support hearing aid uptake, and 2) Environmental factors perceived to hinder hearing aid uptake. The findings relating to above factor groupings highlight the participants' dependence on advice and recommendation for hearing aids, which could serve to support or hinder hearing aid uptake. On the other hand, participants also commented on receiving ambiguous feedback or insufficient information,

which became a hindrance to hearing aid uptake which can be construed as ineffective information transfer from the clinician to the participant.

Previous commonly reported factors influencing hearing aid uptake were also found in this study, such as the categories Issues with hearing aids (including costs), Recommendation by immediate family, Indirect influence of others, and Attitudes of others towards participant which were perceived to hinder hearing aid uptake. Additionally, new categories pertaining to hearing aid demonstration were found to be an important part of the Malaysian audiology service delivery that was frequently reported by participants as a vital factor influencing their decisions on hearing aids. There is a lack of research on hearing aid demonstration; further investigations in this area would be useful.

Activity limitations and participation restrictions has been previously reported to be an important factor facilitating decisions on hearing aids (Gussekloo et al., 2003; Helvik et al., 2008; Humes et al., 2003; Laplante-Lévesque et al., 2010a; Winsor, 2011); the current study corroborated in this study with the findings from these previous investigations. An additional finding unique to this study is that participants also perceived hearing aids to be a barrier to listening (under the group heading Impressions of activity limitations and participation restrictions during hearing aid demonstration that were perceived to hinder hearing aid uptake) after trialling a number of hearing aids.

The opposite perception was also reported and grouped under the factor heading Impressions of improved activities and participation during hearing aid demonstration that are perceived to support hearing aid uptake. This finding resulted from the provision of hearing aid demonstrations, which is the standard protocol in the Malaysian public audiology service, which reinforces the vital contribution of hearing aid demonstration to hearing aid uptake.

Apart from the influence of hearing aid demonstration, the other key finding observed in this study is that all participants perceived that a multitude of factors served to support or hinder hearing aid uptake. Participants apparently weigh these factors against the individual's personal needs, preferences, and beliefs before arriving at their decisions about hearing aid uptake.

8.2 Clinical implications

The findings of this study offers clinical implications to the audiology service delivery in public hospitals and specifically to the audiologist.

8.2.1 Implications for the audiology service in public hospitals

1) Due to participants' reports of having no knowledge about hearing impairment and audiological services, more effort must be put into public education to increase awareness about various aspects of hearing impairments, the professional trained to assess and manage hearing impairments, and the rehabilitation options available. A possible strategy is to disseminate information at the public health clinics, which is the community's primary access to public health services and gateway to the specialists' services at the general hospital. With this approach, a wider community may be reached regardless of their health concerns and could possibly prompt those with suspicion of hearing impairment to seek early consultation and intervention.

2) Participants' disclosure on absence of knowledge about hearing aids and having negative perceptions of hearing aids suggest that knowledge about hearing aid functions, benefits, and limitations is poor. Therefore, it is recommended to actively promote hearing aid awareness through the use of mass media and even social

network, and provide access to unbiased sources of information that are easily accessible to the public. Participants in this study also expressed issues with hearing aids that are related to stigmatisation of hearing aids and hearing impairment. Hence, the public also need to be educated on the prevalence of hearing impairment, not just in Malaysia, but also in countries across the world in order to enlighten them about how pervasive this condition is and its impact on individuals affected by hearing impairment and the society.

3) Dependency on hearing aid advice by medical professionals is evident in this study and, in a few participants, served as a hindrance to hearing aid uptake. In view of the potential detrimental effects of the medical professionals' consultation on the rehabilitation process of those presented with hearing concerns, it is proposed that audiologists in the public services increase their contributions into continuous clinical education programmes at the hospitals. Information content could be geared towards elucidating the various intervention options available, and highlighting individual needs and predicaments that must be considered when formulating rehabilitation programmes for individuals with hearing impairment.

4) Hearing aid demonstration has been shown to have an important influence to the participants in this study. While many participants reported positive experiences from the session, others have discovered some of the limitations hearing aids posed in difficult listening situations. This could be related to differences in the environment these study participants were exposed to when trialling the hearing aid. It is suggested that the hearing aid demonstration session is structured and conducted uniformly throughout all public audiology clinics. As much as new hearing aid users need to gradually transition from listening in quiet to the more challenging noisy environment,

clients trialling hearing aids should be exposed only to the best listening situations first, in order expose them to the potential benefits of wearing hearing aids.

8.2.2 Implications for the audiologist

The findings of the study suggest a number of clinical implications for audiologists such as:

1) Based on the findings of personal factors perceived to influence hearing aid uptake, it was revealed that different clients have different motives for seeking audiological consultation. Therefore, the audiologist needs to find out the purpose of the client's visit and to respond to any concerns or misunderstandings that might impact on the client's motivation for obtaining hearing aids. One way of achieving this is to develop a checklist of questions to ask clients in order address any issues regarding hearing and amplification. For further suggestions and recommendations, readers are referred to articles regarding patient-centered care and shared decision making.

2) The findings also suggest that the audiologist should take time to explore any feelings that the client might have regarding their hearing impairment and its psychosocial impact. This would aid in providing more effective counselling to help the clients to overcome and overturn any negative feeling that might deter them from successful rehabilitation. Additionally, the audiologist could organise a group counselling session, whereby clients could share their concerns and difficulties with hearing impairment and learn coping strategies from each other.

3) After recommending amplification, the audiologist should take time to ask about any concerns the client might have regarding hearing aids. Any negative perceptions should be addressed and additional information could be provided to improve client

participation and empower them to make informed decision about hearing aid adoption.

4) Some of the participants in this study rejected hearing aids even though their audiological results warranted amplification, and a few individuals were not even interested in attending a hearing aid demonstration. In order to make the most appropriate recommendations, audiologists should make an effort to understand the clients' reactions towards their hearing impairment and how their livelihood is affected by the hearing impairment. This could be achieved by giving self-administered tools such as the Hearing Handicap Inventory for Elderly (HHIE; Ventry & Weinstein, 1982) and Adults (HHIA; Newman, Weinstein, Jacobson, & Hug, 1991)

5) The findings of environmental factors influencing hearing aid uptake clearly highlighted the impact of the audiologists' recommendations and advice on clients' decisions about hearing aid uptake. Audiologists should be mindful of the way advice is conveyed to clients in order to ensure that they are clearly understood and not misinterpreted. Any feedback and recommendations could be supplemented with a written version to reinforce the verbal feedback and assist the client to retain the information better.

6) The findings related to hearing aid demonstration sessions that were perceived to hinder hearing uptake indicated that clients had varied expectations regarding hearing aid function. Research has shown that prefitting hearing aid counselling sessions involving educating clients on the benefits and limitations of hearing aids can be helpful in creating reasonable expectations on hearing aid use. Therefore, audiologists should make counselling an integral part of the hearing aid demonstration.

7) Attitudes of others towards the client, particularly significant others, were shown to have an influence on hearing aid decisions. It is well established that hearing impairment affects the quality of life for both the individuals with hearing impairment and their significant others. The significant others should be given the opportunity to express their concerns, and queries about hearing impairment. As communication is a two-way interaction, it is crucial to involve the significant others in the rehabilitation process of the person with the hearing impairment. By understanding the perspectives of the significant others regarding hearing impairment, the audiologist can help to create the most appropriate coping strategies for the person with hearing impairment and the significant other.

8.3 Limitations of the study

The limitations of this study include the sampling process, study population, and the translation process of the interview transcript. The first limitation of the study is the small number of hospitals at which data collection was conducted; this restricted the sampling population to a small area within the Klang Valley. Since this was the first study on hearing aid uptake to be conducted in the Malaysian context, it was designed to focus on the areas in the Klang Valley which have the highest population density in Malaysia. The decision to conduct the research at the Malaysian hospital was made because it is the largest audiology service provider in the country. Request was made to conduct the study in all six hospitals (total number of hospitals at the time of data collection) in the Klang Valley, but only two were approved by the authorities in the MOH. Hence, the interview participants may be limited to certain demographics characteristics and other factors influencing hearing aid uptake may yet to be uncovered.

The second limitation is in the study population. Since the interview was conducted on Malay participants, it cannot be assumed that these factors apply to adults of other ethnicities due to cultural and religious differences. The age of the interview participants was restricted to between 40 and 69 years, therefore it cannot be assumed that the responses from this study would be similar to those of people younger and older age than this age group.

Furthermore, the interview data was collected in the Malay language, which posed a language barrier during data analysis process as the research supervisors are native English speakers. This issue was mediated through a translation process which was developed for this study given the investigation's financial and time constraints. The development of the translation process used in this study was made with careful consideration of recommendations from previous studies to enhance the reliability and accuracy of the findings. It is not known whether other methods of translating data from Malay to English would improve the accuracy of the findings.

8.4 Directions for future research

Various recommendations for future studies were made in the discussion section relating to the specific findings in this study. Essentially, in order to fully describe factors influencing the Malaysian adults' decisions on hearing aid uptake, this study needs to be expanded to include adults from other ethnicities and age groups. As Malaysians also adhere to various religious beliefs, future studies need to consider the variation in the individuals' religion in order to further explore the influence of religious beliefs on hearing aid uptake. Although gender difference was not considered in the interview participant recruitment for this study, it has been shown to have an influence on decisions to take up hearing aids (Jenstad & Moon, 2011; Kochkin, 2009). Therefore, future studies could also look into the

effects of gender on hearing aid uptake. Eventually, a questionnaire could be developed to conduct a nationwide survey of the factors influencing hearing aid uptake of hearing help seekers.

The findings related to the participants' attitudes and overall character/ behaviour pattern were shown to be important factors influencing hearing aid adoption and are associated with locus of control. Future studies using specific measures for locus of control would be useful in understanding how this factor influences Malaysian adults' decisions to adopt hearing aids. The findings could then be used to guide hearing aid counselling.

The other important finding in this study is the influence of the hearing aid demonstration on hearing aid uptake. Participants identified various aspects of the hearing aid demonstration that either served to support or hinder decisions on hearing aid use. Further studies should explore what aspects of the hearing demonstration are perceived as being useful to aid hearing aid adoption from the perspectives of clients and clinicians. Different demonstration protocols could be investigated to discover the best practice for the hearing aid demonstration.

The influence of others was found to be an important factor influencing hearing aid uptake. Future studies could also investigate how significant others influence the individuals with hearing impairment to seek hearing help and their influence during the rehabilitation process. The audiologists also played an important role in the adult's decision making. While some participants expressed satisfaction towards the service provided by the audiologist, others reported negative attitudes that were perceived to hinder hearing aid uptake. Future studies could explore clinical interactions between clinician and client, and counselling techniques in an effort to improve client-clinician interaction and clinical practice. Many of the participants also reported the ENT specialist/medical officer in the ENT clinic had a

significant role in their hearing aid decision. Further studies could explore how the advice of the ENT specialists/ medical officers in the ENT clinic impact on the rehabilitation decisions of people with hearing impairments.

The findings related to sources for funding for hearing aids suggests further research on understanding the breadth of the need for funding and investigating the efficiency of the funding application process. Additionally, as other countries such as Australia (Australian Hearing, 2013) and the United Kingdom (Zhao et al., 2015) provide free hearing aids either to government pensioners or all citizens, a cost-effectiveness analysis of government funding hearing aids to Malaysian adults would be beneficial.

8.5 Final remarks

This study found that Malaysian adults with hearing impairment who seek hearing help for the first time perceived a multitude of factors that influenced their decisions to adopt hearing aids. While many of the findings corroborated the findings from previous research, new findings were described including those associated with cultural practices and religious beliefs. Gaps in knowledge were identified which provide avenues for future studies.

Factors influencing help seeking and hearing aid uptake have been investigated before and were described in different ways. This study demonstrated that these factors can be contextualised using the terminology from the WHO ICF model hence providing a common language and framework for future research pertaining to hearing help seeking and intervention uptake. It is hoped that the findings relating to the personal factors and those related to activities and participation could help audiologists to be more perceptive of the clients' needs and to explore issues that may hinder the clients' decision on hearing aid

uptake. The findings related to the environmental factor could be used to improve the audiology service in general.

Studies relating to help-seeking, hearing aid uptake, hearing aid use, and outcome are rare in Malaysia. This study was undertaken due to the lack of knowledge about factors influencing hearing aid uptake in the Malaysian context. It is hoped that this pioneering study will be an impetus for more research in this field in Malaysia.

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APPENDIX A

Part 1

De-identified data form

Participant I.D.:
Date completed: ____ / ____ / _____

Demographic information	
Age at testing	
Gender	
Ethnicity	

Audiological information
Hearing aid recommendation: YES: BILATERAL / UNILATERAL **NO**
Hearing aid uptake: YES: BILATERAL / UNILATERAL **NO**

Audiometric information

	250 Hz		500Hz		1kHz		2kHz		4kHz		8kHz	
	RE	**LE**	**RE**	**LE**	**RE**	**LE**	**RE**	**LE**	**RE**	**LE**	**RE**	**LE**
Bone conduction (dB HL)												
Air conduction (dB HL)												

Part 2

De-identified data form

Participant I.D.:	
Date completed:	____ / ____ / ____

Demographic information	
Age: **Gender:** **Ethnicity:** **Education:** (*primary, secondary, diploma, degree)* **Occupation:** *(current, most recent, previous)* **Occupation status:** *(full time, part time/casual, not working, retired)* **Monthly household Income:** **Personal health concerns/ medical diagnosis/ recent hospitalisations:** **Rate of personal health:** *(poor, okay, good, very good)*	

Audiometric information												
	250 Hz		**500Hz**		**1kHz**		**2kHz**		**4kHz**		**8kHz**	
	RE	**LE**	**RE**	**LE**	**RE**	**LE**	**RE**	**LE**	**RE**	**LE**	**RE**	**LE**
Bone conduction (dB HL)												

APPENDIX B

URUSETIA NIH
Secretariat National Institutes of Health (NIH)
KEMENTERIAN KESIHATAN MALAYSIA
d/a Institut Pengurusan Kesihatan
Jalan Rumah Sakit, Bangsar
59000 Kuala Lumpur

Tel. : 03-2282 9082/03-2282 9085
03-2287 4032/03-2282 0491
Faks : 03-2287 4030/03-2282 8072

Ref : ( ) KKM/NIHSE/P13-1080
Date : 29th November 2013

Nurlin Ali Hanafiah
Department of Communication Disorders
Collage of Science
University of Canterbury

Madam,

NMRR-13-1078-15972 (IIR)
MALAYSIAN ADULT MOTIVATION FOR HEARING AID UPTAKE

Project Location: 1) Sungai Buloh Hospital
2) Tengku Ampuan Rahimah Hospital

This letter is made in reference to the above matter.

2. The Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (MOH) has taken note that the project is to meet the requirement the Doctor of Philosophy programme in the Communication Disorder University of Canterbury.

3. The MREC has no ethical objections with the study. We take note that the study does not require any clinical intervention and involves only interviews and questionnaires for data collection. All records and data are to be kept strictly confidential and can only be used for the study. Permission from the Hospital Administrator where the study will be carried out must be obtained prior to the study. You are required to follow and comply with the decision.

4. Please be informed that this approval is valid for one year until November 29, 2014. You are required to send in the *Continuing Review Form* (Appendix 1) at least 2 months before the expiry of this approval for the renewal of the ethical approval. You will also be required to send in the study completion report and all *adverse events, both serious and unexpected* to the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (MOH) upon completion of this study.

Thank you.

Yours sincerely,

(DATO' DR CHANG KIAN MENG)
Chairman
Medical Research & Ethics Committee
Ministry of Health Malaysia

APPENDIX C

HUMAN ETHICS COMMITTEE

Secretary, Lynda Griffioen
Email: human-ethics@canterbury.ac.nz

Ref: HEC 2013/114

2 September 2013

Nurlin Hanafiah
Department of Communication Disorders
UNIVERSITY OF CANTERBURY

Dear Nurlin

The Human Ethics Committee advises that your research proposal "Malaysian adult motivation for hearing aid uptake" has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 30 August 2013.

Best wishes for your project.

Yours sincerely

Lindsey MacDonald
Chair
University of Canterbury Human Ethics Committee